The Builder.

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"Short" Quantities.

IN the *Builder* for January 21 and January 28 of this year, we published some correspondence initiated by a well-known quantity surveyor, and in which one or two other members of that profession took part, on the subject of "'Short' Quantities," in which the subject was discussed in reference to a case which had just been decided by Mr. Justice Stephen, the case of "Priestley & Gurney *v.* Stone." A letter from one of the parties concerned, intimating that the case had been entered for appeal (a fact of which we had no knowledge at the time the correspondence commenced), necessarily put a stop to its further continuance at that time. The judgment on appeal has now been given, confirming the original verdict, and we reprint in another column the report of the rehearing, as given in the *Times*. The letter from Mr. Sidney Young which we published on January 28, and which formed part of the correspondence just alluded to, was mainly occupied in urging on architects, builders, and surveyors the wisdom of avoiding the necessity of bringing such cases before legal tribunals, where the practice of the profession and the building trade was often so little understood and so much misconceived, and of submitting all such disputes to the arbitration of a professional expert, who would be fully acquainted with the nature and bearing of the questions under dispute. The result of the appeal appears to us to more than justify Mr. Young's recommendation. The judgment itself, and the reasons given for it, appear so extraordinarily at variance with the theoretic justice of the case, as it would present itself to professional and business men engaged in the practice of architecture and in the building trade, that it is difficult for the non-legal mind to understand how that can be good law which, in the general principle set up, is such manifest injustice; and at the same time it must be admitted that the unfortunate confusion of ideas which exists at present as to the real bearing of the quantities on the conditions of a building contract, and the real position and responsibility of the quantity surveyor, is brought out into strong relief by the result of this case, which seems to render it all the more desirable that the theory of the quantities and of the quantity surveyor's responsibility should be placed on a more simple basis of practical working.

It is unfortunate that in this case the defence was not entered into either on the original hearing or on the appeal, the Judges in both cases non-suiting the plaintiffs without considering it necessary to hear the defendant's counsel. We are thus left in the dark as to the actual defence which might have been made to the plaintiffs' claim. It was hinted in one of the letters we published that the defence would have been made that the defendant's quantities were not incorrect at all, and that any discrepancy between the amount of work shown therein and the amount which actually had to be done by the plaintiffs arose from alterations in the plans, or in the course of building, after the quantities were made out. If this were so, it would, of course, have been a full defence both in law and justice; and Mr. Stone, in his letter to us on the 28th January, expressly implied that he had been prepared with a full defence of the case on its merits. Our comments, therefore, must not be taken to imply any reflection on Mr. Stone, whose defence, which we have not had before us, may have been a perfectly good one in every sense. But as the judges did not decide on this defence, and did not at all entertain the question as to whether the quantities were really correct or not, we may set this point aside as far as our argument is concerned. The case was decided on other grounds, which are fully set forth in the report on p. 88.

The defendant, who is a quantity surveyor, had been requested (or commissioned, shall we say?) by the architect for a certain building to take out the quantities from his drawings and specifications, of course with the object of obtaining tenders on the basis of these quantities. The law, no doubt, may say "there is no 'of course' in the matter"; but practically all parties know well enough for what purpose the quantities are required. The plaintiffs gave a tender which was calculated on these quantities, and we presume this was accepted and that they entered into contract to carry out the work. We have nowhere seen this stated in so many words, but we may assume it from the report of the case. They maintain that they found the quantities were materially "short," and did not represent the work they had to perform, and declined to discharge the balance of the surveyor's account for the quantities unless he gave them an undertaking to reimburse them for what they stood to lose through the alleged deficiency in his quantities. Their position in acting thus was, we presume, illegal and irregular—or, at least, it had no legal basis. They eventually sued him for the amount represented by the deficiency in his quantities, and he replied by a counter-claim for the balance of his account. Now, supposing, for the sake of argument, that the quantities were actually short (nothing to the contrary having been assumed by the Court), what are the grounds on which it was decided that the plaintiff's appeal must even in that case have been dismissed? We have, of course, no intention of questioning the interpretation of the law by three learned judges; we do not profess to pronounce any opinion on points of law; what we do think is that in this case the law, or its learned interpreters, did not properly understand the facts before them, and that an arbitrator who was an expert in building would have understood them. The Master of the Rolls commenced by observing that no such action as this had been known before the present case; in other words, there is no precedent; and, as the Master of the Rolls says so, we presume there is not, in law. Mr. Banister Fletcher, however, in his work on "Quantities," cites a case ("Scargill *v.* Shoppee and another") in which the building-owner sued the quantity surveyor for *excessive* quantities, by which he had lost. Mr. Fletcher says: "As I was engaged in this case for the defendants and they were successful, I will only say that a very careful examination of the drawings and specifications enabled me to say that there was no just cause of action against them." We gather, therefore, that this case was gained by the defendants because they were able to maintain the accuracy of their work, not because there was no *primâ facie* ground of action. It would appear to most persons that—in logic, if not in law—if they could be sued by one party to the contract for excessive quantities, they could be sued by the other party for deficient quantities. We may add that this is obviously the opinion as to the justice of the case on the part of one of the most experienced professional men of the day in matters of practice, Mr. Arthur Cates, who says, in his "Surveyor's Decalogue," quoted, with his permission, by Mr. Fletcher:—"The surveyor is liable to the builder for proved inaccuracies or deficiencies in the quantities, and it is an obligation on

him to prepare his quantities with the utmost care and accuracy, that the client may not suffer by excess, or the builder by want therein." Mr. Cates does not, it is true, undertake to say that the surveyor is legally liable, but he evidently thinks that he ought to be and might be: and that again is the view which a professional arbitrator would probably take of the matter. Professor Kerr, on the other hand, in his book, "The Consulting Architect," says (page 181), in regard to the question of quantities, "The remedy for any inaccuracies, he" [the builder] "will then be told, lies in his right to claim damages from the surveyor; but the unfairness of this in practice is shown by the fact that such damages are perhaps never claimed." Professor Kerr here speaks as if there were a legal right to claim damages, but an unfairness in fact, though we confess we do not see where the unfairness comes in. Mr. Fletcher asserts that the fear of such actions induces surveyors often to take their quantities "full," in order to prevent the chance of, or excuse for an action. It is clear, at all events, that both these writers believe (or did believe) in the power of the builder to bring an action against the surveyor in such a case. However, let us see what is the first point in the legal judgment. The Master of the Rolls says: "The contract as to taking out the quantities was made between the architect and the quantity surveyor, and not with the builders." If this is the law, the sooner an agreement is come to between the law on one side and fact and practice on the other side the better. The practice is that, in the first instance, the architect, in commissioning the quantity surveyor, acts for the building owner, and that the building owner is considered to be liable to the surveyor until the contract is signed, or if the building is not carried out; but as soon as the contract is signed the liability to the surveyor lies with the builder; though, of course, in most cases the payment really comes from the building owner. This arrangement is by no means unfair in itself to the parties concerned; but we can easily understand that it may be one which the law cannot take cognisance of: it may work well enough in fact, but it is cumbersome and illogical in theory, and presents difficulties and anomalies in case of any dispute arising. So far, then, the law has reason on its side; but reason does not seem to go very far in its company. The Judge goes on, "The surveyor is employed to take out the quantities for the architect, and hands them to him, and the surveyor has no control over the way in which the quantities are used." This may be the strict legal aspect of the case, where the architect gives the commission to the surveyor to prepare quantities: indeed, Mr. Fletcher distinctly warns the architect that, in spite of custom, it is safest to obtain the client's consent to commissioning the quantity surveyor, otherwise he may find himself personally liable for the surveyor's charges. Here the law is logical; but here again an arbitrator, whose hands are not tied by the law as those of a Judge are, would award in quite another sense, because he knows well enough that the quantities are not taken out for the benefit or at the special wish of the architect. But the next point in the judgment is, to our illegal mind, simply astonishing. "The quantities may not be used at all, *and they do not amount to a representation that they are true in fact*. . . . . The quantity surveyor is not bound to conclude that the bill of quantities will be shown to any one." Such an opinion appears to indicate an entire ignorance of, or an ignoring of, the whole conditions under which, and the object for which, bills of quantities are made out. If that is the only view the law can take of the matter, we can only say that it is no better than a legal quibble, by which the genuine rights of the case are evaded. In regard to the first portion of the sentence, every quantity surveyor who makes out quantities from an architect's drawings knows perfectly well that they are made with a view of enabling builders to tender from them; and if he is not legally bound to know, he is morally bound. It is impossible to understand how a Judge could have made such a remark had he been aware of professional custom in the matter on which he was deciding. A professional arbitrator would not have listened to such an argument from a party in a case for a moment; he would regard it, indeed, as little better than sheer impudence. And what are we to say to the further statement of the learned Judge, that the bill of quantities "does not amount to a representation that they are true in fact." "Is that the law?" as Shylock says. And if so, is it common justice? nay, is it even common sense? What is the use of the bills of quantities if they are not "true in fact?" They are professedly a means adopted of arriving more accurately at facts upon which considerations of payment are to be based, and which cannot be so accurately arrived at in any other way; the person who draws them up knows that they are to be used for that purpose; and yet we are to be told that in law the sending out of such a document constitutes no representation that it is accurate. If not, it is no better than waste paper; indeed, it is worse, for it misleads people to their pecuniary loss. With all respect to so learned a Judge as the Master of the Rolls, we find it somewhat difficult to believe that in this case he can really have correctly interpreted the law. If he has, all we can say is, so much the worse for the law; and that, whatever the law may be, any quantity surveyor who does not mean his quantities as "a representation that they are true in fact" is a dishonest man, morally if not legally; in which conclusion, indeed, we believe every quantity surveyor of high standing will be with us.

What seems to render the view of the case the more unjust as against those who employ quantity surveyors, is the fact that although the builder could not recover from the quantity surveyor for inaccuracies (assuming that such existed in this case), the quantity surveyor can recover his fees from the builder irrespective (apparently) of the accuracy of his quantities. In the letter which Messrs. Priestley & Gurney addressed to us on January 28, they observe "the judgment really states that the builder is responsible for payment of surveyors' fees, while the surveyor is in no way responsible to him for the accuracy of his quantities." That appears to be the exact practical effect of the judgment. The unfortunate builder is to pay for quantities which are to guide him in the estimates, upon the correctness of which his commercial success depends, but he is to have no security that he gets what he pays for, and no remedy, if the quantities should prove to be inaccurate, against the person who supplied him, because the latter "made no representation that they were correct." Would the learned judges, on the same principle, rule that if a man bought a loaf of bread, and found that it was adulterated with deleterious ingredients which rendered it unfit to eat, the purchaser would have no remedy against the seller, because the latter "did not give any representation that it was wholesome bread?" In most transactions in life it is assumed that when a man sells an article which others require, and are ready to pay for, he sells them what they want, and not merely something which looks like it. But in the case of quantities he may, it appears, sell something which is so different from what the purchaser pays for that it is of no use at all, and even leads to direct loss to the purchaser, and yet the latter is to have no remedy. If this is really the case, some of the standard works on quantities must be revised. To quote again from Mr. Fletcher: "To sum up, it may be said that he who pays for the quantities has his remedy against him who prepared them. There must in law be a payment for work done to enable a person to complain of that work. If, therefore, the successful builder pays for the quantities and they are short—he is *not* likely to complain if they are full—it would appear he has his remedy, unless something has been said or written to exonerate the surveyor who took out the quantities." Mr. Fletcher is not a lawyer, and, of course, in law may be wrong; and the fact that there must be payment for a work to entitle any one to make a complaint does not necessarily imply that payment in all cases does so entitle him, but it certainly gives ground for a strong presumption in that direction, and Mr. Fletcher has had so much to do with Quantities cases that we should expect to find that he had some practical grounds for his opinion thus given in a book specially prepared as a guide to quantity surveying.

Of course, we speak with full recollection of the celebrated dictum of an English Judge, "I am not sitting here to administer justice; I am sitting to administer the law." Our contention is this: First, it really does seem open to question whether the learned Judges in this case have not been led, by a misconception of the facts before them, into a definition of the law which they would not otherwise have given, as we find it difficult to believe that the law can really mean that a man is entitled to receive payment for a document, the very essence of which lies in its accuracy, if, through his own incapacity or inattention, it is inaccurate. Secondly, that if the law does state so, steps should be taken to amend it in the interests of common justice; and that it would be desirable for the quantity surveyors themselves, in their own interests, and for the honour of their profession, to make it plain that they, at all events, in giving out quantities which they know well are to be used for estimating, do intend to represent that those quantities are correct, and to abide by that understanding. Thirdly, that if parties in such disputes would appoint a professional arbitrator who understands the subject, they would be far more likely to get substantial justice all round, than by taking the case before legal authorities who do not understand its real merits.

"REMNANTS OF OLD ENGLISH ARCHITECTURE."

UNDER this title Mr. T. Locke Worthington has added another to the numerous collection of books illustrative of ancient architectural remains.* As long as they are good, and do not too much repeat each other, there cannot be too many, for to any one who takes a real interest in architecture, whether as an architect or as an amateur, there can be no more delightful possession than a library of books illustrative of ancient architecture. The best among them form at once examples of fine drawing, and often of picturesque effect, records of the work of past ages, and suggestions for the work of the future; we turn over their pages lovingly, and find in them a pure enjoyment of architectural design and architectural history which is a welcome change and repose from the prosaic and often irritating accompaniments inseparable from the actual practice of architecture as a profession of the present day.

Mr. Worthington's book is not among the illustrative works of the first class in regard to scale and execution, nor in regard to the interest of the subjects treated, which are somewhat miscellaneous, but it is an interesting and picturesque volume, and contains some very well-executed drawings; and there is a certain point given to the publication in the preface, as being a kind of protest in favour of doing more justice to the architectural remains of one's own country. It is true that many persons run away to the Continent to look at and draw architectural remains there, who have paid little attention to work in England. It can hardly be said, however, that English architectural remains have not received their fair share of illustrative publication. The fact is that, the area being limited as compared with that of the Continent, such a large proportion of the English architectural remains have been measured,

* Remnants of Old English Architecture; thirty-five Plates of Measured and Perspective Drawings. By T. Locke Worthington, A.R.I.B.A. London: Sprague & Co. 1888.

sketched, and otherwise illustrated, that a majority of those who wish to produce books of architectural illustration go abroad, as having the better chance there of finding things which have not already been published. Nor is there in Mr. Worthington's book very much that has not been illustrated, and illustrated rather often. Some of the books which are in all architectural libraries are, however, now out of print and not to be had, so that new illustrations fill a gap for the younger generation of collectors of works of this kind.

Mr. Worthington has bestowed the fullest attention in his work to the remains of Wenlock Priory, to which he devotes two double-page and six single-page plates, and which is very completely illustrated by measured drawings, a large collection of mouldings, and occasional perspective sketches. There has been, we believe, no book published in illustration of Wenlock Priory since the essay by Roberts in 1862, which is probably not in print now. The remains have, however, been a good deal measured by other architects or students recently. Mr. Worthington gives a complete ground-plan of the remains, shaded differently to show the parts still standing to any height, and those of which the foundations alone are left, with dotted indications of piers and other portions of which there is no actual trace left. The portions standing are given in measured elevations, with a larger-scale drawing of the south transept; and one example is given (Plate V.) of the combination of geometrical measured drawing with shadowed effect, of which the French architects are so fond, and which is one of the best means of showing both the actual lines and pictorial effect of a building. This is an "ink-photo" from a shaded section of the south transept, showing the interior elevation of the end wall. We have selected two of the Wenlock Priory plates for publication as examples of the work in the book (*see* lithograph illustrations)—one of them containing a number of detail sketches, with a general view of the remains and a measured elevation of the Chapter-house entrance; and the other giving the measured drawings of the interior walls on the north and south sides of the Chapter-house. The Chapter-house is the only portion remaining of the first Norman building (the foundation of the Priory was before the Invasion), and the interlacing arch work on the walls is a curious and rather unusual example of the application of this form of ornament over an expanse of wall, instead of as a mere longitudinal arcade. The Chapter-house had the three arches opening from the end cloister, usual in Norman and Transitional Chapter-houses, as shown in the elevation on the other plate. The view given in the middle of this plate shows in the distance the remains of the south transept and the Chapter-house entrance, from the north aisle of the nave; but the circular base of a pier in the foreground does not keep its place quite in regard to proportion with the rest of the drawing; it is drawn with almost as much delicacy as the more distant pier on the right, and consequently looks too large in scale in the drawing. This sketch, and some of the measured elevations of Wenlock, have suffered a little from reduction to too small a scale in photographing.

A detail of one of the windows and some of the carving from Stone Church make a very good Plate (IX.). In the small and neat perspective drawing of part of Pershore Abbey (XIII.) the effect is a little too hard, from the too-decisive drawing of lines at the external and re-entering angles of buttresses, &c.; the measured drawings are, in fact, the best portion of the work; the author's touch and feeling in perspective drawing will bear some further cultivation,—at least as to pen drawing. The water-colour drawings, reproduced in ink-photo, are much more satisfactory in artistic effect. Among them are a view in the porch of Cartmell Church, Lancashire, some street-scenes in Bristol and Gloucester, and some good sketches of Stokesay Castle, done in line and touched with brush shading. "Harvington Manor" (Plate XXIV.), another of the ink-photos from a brush drawing, is an interesting example of a half-timber house. There are a good many small pen sketches of old houses from various towns, which are well selected and interesting as illustrations, but not so pleasing as drawings, owing to their rather scribbly style of execution and lack of effect.

A very good ink-photo drawing is given of part of Chester Cathedral, from the cloister court; but when the author describes this in the text as a drawing "illustrative of the Rectilinear style," is he fully alive to the fact that almost every detail in this view, if we remember rightly, is modern work merely faced on to the original walls? There is no indication in the text that it is not given as old work.

NOTES.

THE Railway and Canal Traffic Bill passed the third reading in the House of Commons last week, amid general congratulations. Mr. Mundella, in appealing to the House not to make any further alteration in it, described it as a good and workable measure; and he has since stated that, in his opinion, it is the best piece of work that has been done for the last two years. Mr. Bolton, who has done his best to safeguard the interests of the railways during the passage of the Bill through the Lower House, also admitted that it was in a better condition than he had anticipated. If we may judge from Mr. Parkes's speech at the Great Eastern half-yearly meeting, on Friday last, the gloomy forebodings of the companies with regard to the Bill have given place to a complacent resignation, if not satisfaction. The Great Eastern chairman "does not apprehend that much harm will accrue from it." There was yet one more attempt to get some provision imported into the Bill "protecting" the interests of North-Eastern ports. Some hon. members look upon it as a certainty that "transit" traffic between the northern ports of Germany and the northern ports of America (which passes across this country between Hull and Liverpool) will be absolutely killed by the clause forbidding preferential rates. The Government do not believe that this danger exists, and, after a good speech from the Attorney-General explaining their intention with regard to the clause, it was allowed to stand without alteration.

THE following cities and towns are made Counties by the new Local Government Bill, to each of which we have added its population at the last Census, viz.:—

Canterbury	21,704	Rochdale	68,866
Bootle	27,374	Halifax	73,630
Worcester	33,956	Plymouth	73,794
Gloucester	36,521	Wolverhampton	75,766
Chester	36,794	Croydon*	78,953
Lincoln	37,313	Derby	81,168
Exeter	37,665	Huddersfield	81,841
Reading	42,054	Cardiff	82,761
Coventry	42,111	Birkenhead	84.006
Dudley	42,258	Norwich	87,842
Great Yarmouth	46,159	Preston	96,537
Hastings	46,252	Blackburn	104,014
Barrow-in-Frness	47,100	Bolton	105,414
Wigan	48,194	Brighton	107,546
Hanley	48,361	Oldham	111,343
Devonport	48,939	Sunderland	116,542
York	49,530	Leicester	122,376
Ipswich	50,546	Portsmouth	127,989
Bath	51,814	West Ham*	128,953
Northampton	51,881	Hull	154,240
Bury	52,213	Newcastle	145,359
Middlesbro'	55,934	Salford	176,235
West Bromwich*	56,295	Bradford	183,032
South Shields	56,875	Nottingham	186,575
St. Helen's	57,403	Bristol	206,874
Burnley	58,751	Sheffield	284,508
Walsall	58,795	Leeds	309,119
Stockport	59,553	Manchester	341,414
Southampton	60,051	Birmingham	400,774
Swansea	65,597	Liverpool	552,508
Gateshead	65,803		

* These three have been incorporated as boroughs since the date of the last Census. The population above-named is that of the previous Urban Sanitary District in each case.

FROM the Calcutta correspondent of the *Times* (July 30) we learn that the last Simla *Gazette* contains the exposition of a policy of sanitation reform, progress in regard to which appears to have been checked hitherto, as every one who knows anything of native prejudices would easily understand, as much from the ignorance and conservatism of the mass of the people as from want of executive agency. In fact, we may take it that executive sanitary agencies would have been practically almost inoperative through the impossibility of getting people to understand or obey their regulations. It seems to be now thought, by those who know the country, that public enlightenment in India has progressed so far as to render some official attempt at sanitary reform possible. We gather from the brief *résumé* of the Calcutta correspondent that it is proposed that urban and rural sanitary districts should be formed, and that a sanitary board should be established in each province, through which the local government can operate, for the control and supervision of all sanitary works. The commissioner of a district would also be an *ex-officio* member of such a board. We shall hope to hear more before long of this new departure on the part of the Indian administration.

THE announcement that the London and North-Western Railway Company had determined to still further accelerate their morning train to Edinburgh, reducing the journey to eight and a half hours, as against the old ten hours, has (of course) been followed by the announcement of a similar acceleration in the Great Northern service to Edinburgh, which is to be reduced by this company to eight hours. The "L. & N. W. R." undertakes an average speed of forty-seven miles an hour, the "G. N." one of forty-nine miles an hour. Unless stoppages are considerably reduced in number or in the time allowed, which is not very likely, these figures, of course, mean a much higher speed over the road than the nominal speed above named; but if the acceleration is judiciously carried out, we do not think the nervous traveller need be under any alarm. The acceleration, if it is to be made by actual increase of running speed, need only mean that a speed which is now frequently attained in certain parts of the route would be distributed more generally over the whole route, as far as inclines permit. The speed of the L. & N.W.R. Scotch trains is often, for a considerable portion of the route, very moderate for these days of improved locomotives and roads, and would bear considerable addition without arriving at an apparently dangerous limit. No doubt an increased consumption of coal will be required to maintain over the whole route, or over a greater length of it, the speed daily attained in certain portions, and the drivers would have to aim at climbing gradients at a higher speed than before, which would unquestionably mean the arrangement of "coal premiums" on a fresh basis. There may, however, come a period, in the race between the two railway companies as to who shall be fastest, when the interference of the Board of Trade would be desirable; for if the limits of safety in speed are not yet overpassed, there is great temptation to overpass them if this game of out-bidding one another in speed is to go on unchecked. The Midland Company, which has been usually considered as specially enterprising in character, has not joined the move for acceleration so far. Whether this is due to the fact that the character of certain parts of the Midland route renders any great acceleration of speed obviously dangerous, or that the Midland Company is aiming at the policy of representing theirs as a specially safe route in which no racing is countenanced, who can say? If the other two companies go too far in their racing game, the "safe" policy may turn out a paying one in the long run.

THE monument to Sir Herbert Stewart, which was unveiled by Lord Wolseley on Friday last week, but which we found this

week again closed in from public view for some further working on it, is a bronze bas-relief, in very low relief, forming a broad band below one of the windows on the north side of the nave. The bronze follows the curve of the base of the small semidome, but does not fill the whole curve, as the space at either end has been already occupied by two bas-relief panels in marble, monumental carvings which have been there for a good many years. It would have been more in keeping with architectural requirements and decorative effect if the new memorial had been executed in marble also, instead of inserting a bronze bas-relief between two marble ones. We should have thought this would have been a point Mr. Penrose would have seen to, but we regret to learn that Mr. Penrose is little consulted on matters on which his advice would often be very valuable, and on which we should have thought it came within the responsibilities of his office to advise. The bronze, designed by Mr. Boehm and executed in bronze by Mr. Barnard, consists of three panels, the centre one containing a bust portrait of Sir Herbert Stewart in a circular medallion. Mr. Boehm has been trying the same kind of experiment that Mr. Natorp has been trying with Mr. Browning's portrait, of treating a full face in very low relief. We cannot say we think the system satisfactory. Bas-relief in low relief is better suited for a profile portrait; in a front face it is impossible to get over the impression of the face having been compressed. The rest of the work contains no details of any great beauty or significance. The monument to Gordon, erected by his brother, which has been there for some time, was first given to public view on the same occasion. It is a bronze recumbent figure on a pedestal, in sarcophagus form, of black marble. The figure, which is simple and dignified, is also, we believe, designed by Mr. Boehm. The monument stands in front of the window recess, on the chord of its apse, or nearly so. The inscriptions are on brass affixed to the black marble, with good decorative effect, and the whole monument is in good taste, the peaceful expression and attitude of the figure contrasting strangely with the troubled life of the hero it commemorates. On other than artistic grounds, at least, this corner of the cathedral should be dear to all high-minded Englishmen. The following is the inscription on the brass plate on the side of the monument facing the nave:—

"To Major-General Charles George Gordon, C.B., who at all times and everywhere gave his strength to the weak, his substance to the poor, his sympathy to the suffering, his heart to God. Born at Woolwich, 28th of January, 1833, slain at Khartoum, 26th of January, 1885. He saved an Empire by his warlike genius, he ruled vast provinces with justice, wisdom, and power, and lastly, obedient to his Sovereign's command, he died in the heroic attempt to save men, women, and children from imminent and deadly peril. 'Greater love hath no man than this, that a man lay down his life for his friends.'"

CONCURRENTLY with the thorough repair of Crowland Abbey* we read that it is found necessary to begin a restoration of the neighbouring abbey of Thorney. This ancient minster stands upon an elevation of the Drift and Lower Green Sand by the Morris and Fish Fens in the north-western corner of the Isle of Ely. Thorn-eye, like to El-eye, lay near to the Roman stations at Durobrovis, (Caistor, on the Nene), and Camboritum (Cambridge), in a district which had been held by the Iceni, whose capital was at Norwich, and whose war-path the Icknield-way. The Romans having departed, the Britons made good their stand here until dispossessed by the Gyrwas from Engleland: *circa*, 550 A.D. The Gyrwas remained in the Fens; their kindred tribe, the Lindiswaras, settled in the Wolds of Lincoln. Uffa, overlord of East Englia, took up his residence in, and fortified Norwich (571-8); and there Anna, with others his successors, kept court. About the time of the death of Tundbercht, Earl of the South-Gyrwas, whose widow, Æthelthryth, daughter to Anna, founded (673) the convent at Ely, a retreat for anchorites was established in Thorn-eye, hence also known as Ankeridge. This was done by Saxulph, first abbot of Medehamstede (Peterborough), with the aid of Wulfhere, Lord of Mercia, and brother to Peadha, who is reputed to have founded that monastery. The anchorites were dispersed, and their settlement was burned, by the Danes. About one hundred years later, Æthelwold, Bishop of Winchester, refounded Ely and Thorney as well. The latter he dedicated to St. Mary the Virgin, for monks Benedictine (972), whereof the abbots in course of time attained to high eminence, and sat in Parliament. It was to these fens that Morkere, Earl of Northumbria, repaired to join Hereward the Wake in his final resistance against the Conqueror, when the last hope of England died with the surrender of Ely (1071). King John granted the patronage of Thorney to Eustace, Bishop of Ely, and his successors. At the Dissolution its yearly revenues amounted to 411*l.* 12s. 11d., according to Dugdale; Speed estimates them as 508*l.* 12s. 5d. Most of this property, together with the monastery site, was given in 3 Edward VI. to John, first Earl of Bedford. The Russells, who formerly lived at Thorney, continued the monks' good work, as eulogised by William of Malmesbury, in draining and cultivating their low-lying lands. This enterprise, wherein Cornelius Vermuyden played his share, is commemorated by the name of the great "Bedford Level." The minster had been rebuilt in 1128; in 1638 the nave was converted to parochial uses; and about forty-seven years ago the church was enlarged, after Mr. Blore's designs, at the cost of the Duke of Bedford, in whose honour the tenantry subscribed for a fine organ. Many of the parishioners are descended from Walloon and French *émigrés*, and a register was kept, for a while, in the French tongue. With Thorney may be compared a parish of that name in Nottinghamshire, the hamlet by Langport in Somerset, and the ancient designation of the site of West Minster.

* See the *Builder*, June 23rd, 1888.

THE recent presentation of the Gold Medal of the Institute of British Architects to Herr Hansen seems to have been much appreciated both in his native country, Denmark, and in Vienna, of which city Herr Hansen is now practically a citizen. The Viennese architects gave the recipient of the English gold medal a banquet in honour of the event.

A QUESTION by Lord Meath, in the House of Lords last Monday night, elicited from Lord Henniker the information that a sum of money has been placed at the disposal of the Government by an anonymous donor for the purpose of laying out temporarily as a garden the waste wilderness to the west of the Law Courts, which ought to have been so laid out long ago. By "temporarily" we mean until the ground may be required for the extension of the Law Courts, when, of course, the garden would have to be disestablished, partly or entirely; but it may very likely be many years before this necessity arises, and we are very glad to hear that we are not to have the ground left in its present unsightly state for all that time. The thanks of the public are due to the anonymous donor whose liberality has induced the Government to do at last at private cost what they ought to have done themselves long ago. It is gratifying to add, considering the indifference, and even contempt, with which architectural assistance in the matter of laying out or beautifying London is usually regarded by the Government, that in this case the ground is to be laid out "in accordance with a plan prepared by Mr. Street, the architect of the Law Courts," though it does not clearly appear, from this statement, whether we are to understand that it was the late Mr. Street who left a plan for laying out the grounds, or the present Mr. Street who has specially prepared one.

THE first fire inquest under the Act which was passed this session was held last week, but the jury were unable to arrive at a conclusion as to the cause of the fire. This is a very frequent result, as we all know, of the deliberations of a jury; and though it is satisfactory that some special machinery now exists to inquire into London fires at which life has not been lost, yet it is very doubtful whether the jury is either necessary or desirable. The inquiries into shipping casualties, as well as into mining disasters, are always held by inspector, wreck commissioner, or magistrate. Very beneficial results have followed from these inquiries, and, in our opinion, it is very doubtful whether fire inquests will have any practical result, unless they are conducted on lines similar to those of inquiries into casualties at sea.

IN reference to our recent article on Sir Henry Roscoe's reports to the Board of Works, Dr. Dupré sends us some correspondence dated five years back between himself and Sir J. Bazalgette and Dr. Dibdin, showing that he had at that date strongly urged the expedient of mechanically aërating the sewage "between the pumping-station and the reservoirs, and perhaps again between the reservoirs and the river." We have not space to print the letters, but as Dr. Dupré wishes to have it known that this expedient was strongly and repeatedly urged by him on both the Engineer and the Chemist of the Board some years ago, we willingly testify that the letters he has placed in our hands bear out this claim. Dr. Dupré, however, appears to have contemplated aëration in conjunction with chemical treatment, not in entire substitution for it.

THE *Indian Engineer* for July 4 commences an account (to be continued in another number) of a series of tests applied to the Hooghly Jubilee Railway Bridge to account for some movements which it evinced when trains passed over it. The account is a long one, and is illustrated by a number of diagrams shewing the resulting strains and displacements when the bridge was loaded at one end. The bridge is a double cantilever, with two piers under the centre portion.

IT is well known that the officials of the Post-office invariably interpret their instructions as to surcharges in a strictly literal manner. A point which has given rise to considerable annoyance is the surcharging upon postcards the original address on which has been altered. In accordance with the regulation under which all writing besides the (actual) address is excluded from the stamped side, persons who have corrected an inadvertent error in the name of a street have thereby subjected the receiver to a penalty. A case of this nature, in which the pound of flesh was exacted after a strong protest, has led to the subject being reconsidered by the Postmaster-General, who has now instructed postmasters that, for the future, a postcard need not be charged for any alteration which is evidently a mere amendment of the address, it being perfectly clear that the card had not been previously used. This is satisfactory; for, although it may appear a very trifling matter, friction between the public and public servants is often productive of an amount of irritation quite out of proportion to the amount involved, and it is highly desirable that the occasion for such unpleasantness should, if practicable, be removed. The absurd and vexatious manner in which this regulation about postcards used to be enforced was admirably illustrated in one case that came under our notice, where a postcard was sent to make an appointment for ten in the morning, and the word "Immediate" written on the top, in order that the card might be immediately sent on if the receiver had left the house before it arrived. At two p.m. the card, making an appointment for four hours previously, was sent back to the writer with the announcement that it could not be delivered without an extra fee, because "Immediate" was no part of the address.

THE Burstow Park estate, Surrey, will be offered for sale at the Mart on the 29th inst. This property, of nearly 800 acres, lies under the Nutfield hills, on the borders of Sussex, two miles and a-half south-east of Horley, and seven miles distant from Reigate. The sale will include the old manor-house, with its farm-buildings, and the Stonehouse farm, with its cottages, &c., as also some separate lots—about 100 acres in all—of enclosures, houses and gardens in the immediate neighbourhood, and the Burstow Hunt kennels. The parish of Burstow extends over 4,760 acres, and was formerly a "peculiar" of the province of Canterbury.

AT the sitting of the Board of Works Commission on Tuesday, Sir J. Bazalgette, who was recalled and asked some questions as to the work on the Thames Embankment, appears (if his answers are correctly reported) to have adopted a rather easy idea as to an engineer's responsibilities in looking after an important piece of work. The question was whether or not mere rubbish had been used as part of the filling for the Embankment:—

"Are you aware that people paid the contractor for being allowed to deposit rubbish there?—I know nothing of that; but, speaking from recollection, I believe there were a few cartloads paid for. Others came from a distance, where the contractor paid for them. Of course, that was a matter I had nothing to do with. The specification showed that part of the filling-in was to come from the land and part from the river Thames.

Sometimes considerable sums are paid for permission to deposit rubbish?—It depends on the distance that it has to be carried. It is a matter as to which I, as engineer, should not interfere in the least."

That the work, as completed, has been satisfactory no one contests, but does Sir J. Bazalgette mean to affirm that, in the case of a great operation of embanking for a permanent roadway, it is no part of the engineer's duty to know what sort of stuff is being used for the filling, or to interfere to prevent the use of unsuitable material? And is that the view of the engineering profession generally? That Sir J. Bazalgette did not consider the use of ordinary "rubbish" filling satisfactory is obvious from his insisting on the fact that "only a few cartloads" were used. How, then, is it a matter "in which, as an engineer, he would not interfere in the least?"

THE death of Mr. Frank Holl, at the early age of 43, leaves a sad gap in the ranks of our foremost portrait-painters. Mr. Holl's portraits were, no doubt, open to the charge of being mannered, chiefly in respect to a peculiar trick of lighting which nearly always recurred in them, and it may be that the place they will take in the art has been rather overestimated by some of those who were naturally carried away by the force and brilliancy of expression and effect which characterised nearly all Mr. Holl's portraits. If they were not in the first rank of portrait-painting, however, they were at the head of the second rank, and every year seemed to add to the artist's best qualities and diminish his mannerism. The amount of good work which he has produced in so short a life says everything for his energy and power of ready insight into the problem of portrait-painting.

THE proposed visit of the Architectural Association to Professor Herkomer's house and schools at Bushey, which was announced in our list of meetings as for Saturday last, had to be given up on account of the sudden death of Professor Herkomer's father. Many who knew the deceased personally, and others who knew him by repute, will regret to hear of the death of a man of noble and independent character, who was much respected. Mr. Herkomer was a wood-carver, working with his own hands, and taking a pride in his craft, and an interest in many things beyond. His portrait, painted by his son, has been recently exhibited in the "New Gallery" exhibition.

THE first number of *Artistic Japan*, published in May,* and announced as "a monthly illustrated journal," does not appear to have been followed up by any publication in June or July. Whether this is only a temporary delay or an admission of failure we know not. The first number contains illustrations of various very pretty bits of Japanese diaper design, not differing much in character from a great many more of such designs with which we have been familiarised of late years, and it includes a beautiful chromo-lithograph reproduction of a sheet of highly-tinted bird studies, of the class of which many fine examples are now to be seen in the British Museum—a branch of work which shows the Japanese artist at his very best. The same number contains things which serve to illustrate the uncritical spirit in which all things Japanese can be swallowed wholesale by those who have trained themselves up in this direction. There is a chromo-lithograph of a landscape or sea-coast view, for example, which, from the point of view of European landscape painting, is simply childish, and nothing better than a tea-tray painting. And this is to be called "art," forsooth, because it is done by a Japanese!

* Sampson Low & Co.

LETTER FROM PARIS.

THE National Fête, which is the pretext every year for a distribution of crosses of the Legion of Honour, has this year specially favoured architects. Among the names of the newly "décorés," published in the *Journal Officiel* of July 14, are those of M. Laloux, the young architect who exhibited, in 1885, such an interesting restoration of the Altis of Olympia; M. Boileau, the architect of the Gambetta monument; M. de la Roque, diocesan architect of Beauvais and Nevers, and for sixteen years Professor at the École National des Arts Decoratifs; and M. Gallois, architect of the "Assistance Publique de Paris" and of the "Mont de Piété." One cannot but felicitate M. Lockroy on having paid a little more attention to artists than is usual in these official lists of honours.

As has been recorded in the daily papers, the Government took the opportunity of the annual fête to invite the Maires of all the principal towns of France to a great banquet in the gallery of the "Expositions Diverses" of the Exhibition buildings, at which 3,000 persons were seated. Without going into the details of this gigantic reception, we may mention the fine effect of the great nave adorned with quantities of foliage and splendid Gobelins tapestries, and illuminated by electric light. Thanks to the care and zeal of M. Alphand, the affair was a complete success.

In connexion with the Exhibition a large wharf is being constructed on the river bank, above and below the Pont de Jéna, to be completed in about five months, and which is to form a landing-place for objects or products intended for the Exhibition. In the midst of the river also, at the extremity of the Ile de Grenelle, a great pedestal is being built to receive the statue of Liberty presented by the American colony in Paris, a bronze statue which is a *replica* of the one at New York. The statue will stand eleven mètres in height, and the cost of the pedestal will be about 78,000 francs.

In reference to the Exhibition, it may also be mentioned that the Government intend to appoint, to take part in the International Congress of Architecture in 1889, a certain number of French architects as national representatives. Among the most prominent are MM. Bailey, Bœswilwald, Chipiez, César Daly, Daumet, Chas. Garnier, Hermant, Chas. Lucas, E. Monnier, A. Normand, Sédille, and Paul Wallon. M. Antonin Proust has been named Special Commissioner of the Fine Art Section of the Exhibition.

The jury have given their award in the second competition for the decorative painting of suburban Mairies of Arcueil-Cachan and Nogent-sur-Marne. When the first competition was decided, three months ago, three artists were selected to compete finally for each of the buildings, MM. Baudouin, Bramtot, and Vimont for Arcueil, and MM. Debon, Léenhardt, and Ary Renan for Nogent. The second trial has been a failure for the three last-named artists, who have sent in very feeble works, and the premium has not been awarded. The result of the Arcueil competition is not very much better; but the jury have, nevertheless, decided in favour of M. Baudouin, whose work is a reminiscence of the manner of M. Puvis de Chavannes, but without the fine effect of light and breadth and simplicity of composition which distinguish the works of his model.

There is to be another painting competition shortly for the decoration of the Mairie of the 14th Arrondissement, the enlargement of which by M. Auburtin is nearly completed, and a competition in sculptural and architectural design is also to be shortly held, with the view of evolving a monument to the memory of Danton. The effigy of this melancholy hero of a day of violence is to take the place of the statue to Broca, near the Faculté de Médecine, and 60,000 francs have been voted for this somewhat unseasonable memorial.

The Municipal Council, on the other hand, have decided to accept the offer of Dr. Evans, an American, to erect at his own cost an equestrian statue of Lafayette. The site is already chosen, but the work itself is still to be designed. According to report, an old statue by Clésinger is to be adapted to this new destination, with a benevolent intention of benefiting the present representatives of the artist. If it is so, it is rather a poor scheme, and the statues of Hoche and Marceau, also by Clésinger, which have long faced the weather in the Champ de Mars, are not of such excellence as to make one desirous to see Clésinger's work further illustrated.

After many years the Carnavalet Museum is at last completed. A new building, designed by M. Bouvard, now flanks the Rue de Francs-Bourgeois, and encloses the "Arc de Nazareth," that fine specimen of the art of the Renaissance of which we have before spoken, and which will be fenced in by a wrought-iron grille. This gallery, intended for old pictures illustrating the history of Paris, will be a useful complement to collections of other antiquities in the Carnavalet, which are quite distinct in character from those of the Musée d'Auteuil. The latter embraces the modern collections; those of Carnavalet illustrate the history of the past.

The engineers of the Municipality are pushing on vigorously the iron viaduct which is to cross the cemetery of Montmartre to prolong the Rue Caulaincourt to the Boulevard Clichy. This carrying of a road across a burial-ground has caused some outcry at it as a profanation of the resting-places of the dead, especially in a city where what may be termed the "Culte des Morts" is carried to excess; but the Administration has taken every pains to avoid all actual disturbance of graves or monuments. The viaduct will be furnished on each side with very high bulwarks of iron standards and cross-heads, filled in with an iron trellis so close as to prevent either climbing over or the throwing of stones through it, which might injure the monuments.

We are also to have soon a rope traction railway from the Place de la République to the heights of Belleville. This work, which will cost about a million francs, is to be carried out by the Municipality. If this experiment succeeds, a second similar railway is to be made to the heights of Montmartre.

It must be admitted that the City Government of Paris shows a thoughtfulness for public good, and a spirit of initiative, which we do not find in connexion with work done under State control. This is exhibited not only in practical improvements, such as we have just alluded to, but in work for the intellectual advancement of the people, as in connexion with the important work of artistic instruction. In the State Lycées, the pupils have only two drawing lessons a week, or a total of eight hours per month, which is quite insufficient for any practical result. The course of instruction, too, is only optional, and can be dispensed with on a simple attestation of the parents. Music and singing are taught in the State schools as extras only, and on payment of a special fee over and above the already heavy school expenses.

On the contrary, in the primary and free schools of Paris, the teaching of singing, drawing, and modelling is obligatory, and given by certificated professors, selected by competitive examination, and subject to the constant control of inspectors.

It may be of interest to give some details on this subject, which will show the progress made in Paris, thanks to the exertions of Viollet-le-Duc and of M. Greard, Rector of the Academy, in the popular instruction in drawing, which commences from the École Maternelle—where it precedes even the teaching of writing, and is continued in the primary elementary schools

for boys and girls, and is carried on from the round in the superior elementary schools, where four hours a week are devoted to it. In these latter schools the course includes drawing from the round, geometrical drawing, and architectural drawing. Lastly, special classes for drawing and modelling are open every evening from 8 to 10, in a certain number of the "Écoles Communales," for young apprentices and for adults. The teaching of adults includes geometrical drawing, mechanical drawing, architectural drawing, stereotomy, and water-colour drawing. The number of these classes now organised is 63, and they are attended by about 4,000 pupils.

In order to afford to girls and young women who are in training for industrial or artistic occupations a complete instruction in drawing, the municipality subsidises a certain number of free schools of drawing for women. There are fourteen of these schools. This is not all; to mark further the interest which they take in this class of instruction, the city authorities organise an annual competition between all the pupils of the primary elementary schools, with prizes of books, &c.; and other annual competitions take place between the pupils of the subsidised schools and of the evening classes. The prizes for these are books, medals, or money for travelling expenses ("bourses de voyage"), enabling those who show special ability to make a tour for study in France or abroad,

Lastly, in order to organise an instruction in the practical application of drawing, there have been established a few years since two new schools—one a preparatory school in the preparation of drawings for special objects, the other for the application of drawing to a certain number of industries.

In the first of these two schools, situated in Rue Ste. Elizabeth, and under the direction of M. Jobbé Duval, the painter, the instruction includes applied mathematics, drawing from the round and from the life, sculpture and decorative painting, architectural drawing, the composition of ornament, and the study of art history. The second school, in the Rue des Petits Hôtels, is a kind of complement of the first. It includes three ateliers, one for ceramic art, one for engraving, and one for designs for textiles and furniture. The results obtained by these two establishments have been, so far, very satisfactory, and the creation of new ones in other quarters of Paris for the application of design and drawing to other industries is under consideration. These schools, if started, will be organised with special reference to the industries most prominent in the quarters in which they are established.

We will complete the account with a few figures:—

	Francs.
The cost of the *personnel* and material for the teaching of drawing in the primary schools and in the evening classes is stated in the Municipal budget as	917,600
The school in Rue Ste. Elizabeth represents an expenditure of	41,875
The school in Rue des Petits Hôtels represents a cost of	55,300
The gratuitous instruction in drawing given annually to children and adults in Paris amounts therefore to a total of	1,014,775

Returning now to superior instruction given by the State, we may mention that M. Marcel Lambert, who is a diplomate architect and holder of the Prix de Rome, has been appointed to replace, at the École des Beaux Arts, the vacancy caused by the lamented death of M. Durand Claye, the late professor of stereotomy.

In the competitions which have just taken place for the Prix de Rome, the subject in painting, given by M. Gerôme, was "Ulysses and Nausicaa." The competition was a very poor one, and neither "Grand Prix" nor "Premier Second Grand Prix" were awarded, the jury contenting themselves with giving a "Deuxième Second Grand Prix" to M. Ellot, a pupil of M. Cabanel, and a "mention" to M. Paul Buffet, pupil of MM. Boulanger and Jules Lefebvre. The sculpture competitors had for subject (given by M. Paul Dubois) "Orestes at the Tomb of Agamemnon," on which the jury had not decided at the time of writing, nor has the decision on the architectural prize been yet given; the subject was "A Parliamentary Palace."

M. Oscar Roty, the designer of so many beautiful medals,* has just been elected a member of the Académie des Beaux Arts ("Section de Gravure") in place of the late M. Bertinot. M. Roty, who studied under MM. Dumont and Ponscarme, has already received many medals and official honours in the course of his career.

We have to record the death of two artists of great ability, M. Antoine Etex, the sculptor, and M. Alphonse François, the engraver.

Etex had been a pupil of Dupaty, Pradier, Ingres, and Duban, and was thus entitled to call himself at once sculptor, painter, and architect, though his reputation was gained as a sculptor. He has left works of great merit, especially two of the groups on the Arc de l'Étoile, the monument to Gericault, which obtained a great success in the Salon of 1841, that to Lionville in Pére la Chaise, the group of the "Naufragés" which adorns the park of Montsouris, and the monument raised at Montauban to the memory of Ingres. The Luxembourg Museum possesses several of his works—in particular a painting which is little inferior to his sculpture. He was born in 1808, obtained the Prix de Rome in 1820, a "première médaille" in 1833, and the Cross of the Legion of Honour in 1841. He had also made himself known in literature, and published a remarkable essay, "Sur le Beau."

Alphonse François, whose modest and silent labours contrast curiously with the exuberance of Etex (who was by no means remarkable for self-effacement), died at the age of 77. He was best known for his engravings of the works of Delaroche. He made his *début* at the Salon in 1842, with an engraving after a portrait by Titian. He also obtained various honours and medals, and was an officer of the Legion of Honour. In 1873 he replaced M. Forster at the Académie des Beaux Arts.

P.S.—It is since the above remarks were written that there has arisen the important strike of the excavating workmen, or "navvies," which now numbers more than 8,000 adherents. The strikers, who refuse to accept the official wage-list of 1882, wish to work no more than nine hours, and demand 60 centimes per hour in place of 45. They are strongly supported by the artisan party in the Municipal Council, who solicited a subvention of 10,000 francs for the strikers, which the Council, by a large majority, refused.

The strikers are collecting every day on the Bourse du Travail, rue Jean Jacques Rousseau, and at every meeting there are furious declamations against the masters, and "orders of the day" of the most inflammatory description, but there has been no serious breach of the peace as yet. At several quarters, nevertheless, especially in suburban districts, the gendarmerie and infantry have been obliged to intervene to protect the men who refuse to join the strike.

It should be added that the foreign element is very predominant among the workmen on strike, and the Government is resolved to expel from France the numerous Italians, Belgians, and Germans who have been arrested in the act of exciting to violence.

The situation is no doubt grave, especially in regard to the exhibition; many of the workshops are closed, especially on the "Chemin de Fer de Ceinture," where the work is being carried on (as before mentioned) of substituting iron bridges for level crossings; but it is hoped that the firm attitude of the Government and the measures which are being taken to suppress disorder will bring the strike to an end before long, and that a *modus vivendi* between masters and men will be arrived at.

SOME FURTHER NOTES ON THE GLASGOW EXHIBITION.

This enterprise has just completed the third month of its appointed career, and of success, in the purely business sense of the term, there has hitherto been no lack. The sum of the attendance has been more than respectable, although the form in which the figures, through the medium of the local press, find their way from time to time to the public is hardly a straightforward or rational one. There is no excuse for ranking mere stall attendants as visitors; yet this is done, and not only so, but each entrance is made to count, and an attendant whose exceptional requirements take him in and out twelve times a day, swells the figures by twelve accordingly. There is not the same strength of exception to be taken to the mixing up of season ticket-holders and complimentary visitors with those who pay at the turnstiles (the only unerring criterion), but it would certainly be more candid to keep the two tables of figures entirely separate. Ticket-holders for the most part reside, or at least pursue their daily calling, within a short distance of the building; many of them make several visits daily, and in doing so contribute (innocently enough of course) to the swelling of these same somewhat deceptive attendance returns. Since the opening, on the 8th May, a certain degree of change has been going on amongst the general exhibits, chiefly at the fancy of sundry exhibitors who were unable to open with a full show, or who had afterthoughts as to additions which appeared to them desirable. There has been a gradual process of accretion due to this influence, and there are cases, perhaps, in which it has gone too far. Pottery, earthenware, and glass goods have been added to very appreciably, and to the extent, possibly, of somewhat seriously upsetting the general balance or proportion of the Exhibition. These fragile goods are found, not only in set places, but everywhere, and are come upon incessantly by the examiner, at the imminent risk of suggesting iteration in an offensive degree. Many of the specimens are of undoubted excellence of manufacture and of some artistic merit, but many are only moderately endowed with good qualities of any kind. This department of the exhibition is decidedly overdone, and a ton or two of this class of goods might be carted away, not only with safety, but to the general advantage. On the other hand, there are sections which would bear some augmentation in the interests of this same balance and proportion. Models from the pattern-rooms of shipbuilding yards are present in a force which more than satiates; but although the Kelvin flows immediately under the northern façade of the building, and, by special deepening operations, has been purposely made navigable to a practicable extent, there is nothing on its bosom save a mooring-buoy, a gondola, and two or three craft of the small launch order, only one of these—a new lifeboat deck seat—presenting features at all out of the common. More might have been made of it than this. The Kelvin itself, however, forms an instructive exhibit, although to one or two of the senses in some sort an objectionable one. Its presence here as an inclosed and thoroughly domesticated feature of an institution destined within a brief space to be visited by two or three millions of people, many of them of high initiative rank, may exert an after influence on a still unsolved problem—the prevention of the pollution of rivers. This inconsiderable stream rises in the heart of the Scottish midlands, at a point fully half-way across to the Firth of Forth, thence flowing picturesquely through the valley to which it gives a name, on to confluence with the Clyde at Glasgow, about half a mile below the Exhibition. It has many polluting factories on its banks, and receives several tributaries subject to similar befouling influences, besides carrying away the sewage of a good many towns and villages—none of very large extent, however. Up to within a few months ago a considerable portion of the sewage of western Glasgow drained into it under the grounds of the park, just at the site of the Exhibition, and it still receives the household impurities of those suburbs of Glasgow which fringe the opposite or right bank of the river. Of late years, during the heats and droughts of summer, the Kelvin at this point has emitted a stench past all bearing, quite outdoing the larger-volumed and more fully-diluted Clyde in that respect; but it has been partially relieved by recent deepening and cleansing operations, and it will certainly prove less obnoxious this year. Yet, at this point, even now, it is not a considerable remove above the grade of a very badly outraged stream as regards the sewage and manufacturing refuse still permitted to drain into it. As nearly every visitor will cross and recross it, its condition is bound to attract attention; and, as a kind of impromptu exhibit, in this sense it may help towards the solution of a vexed question in sanitation.

Inside the Exhibition building itself, sanitary appliances, — engineering, architectural, and chemical, — are in most respectable force, and the dirty-faced and badly-odoured Kelvin outside forms a not unfitting complement

* We drew special attention in a recent article on the Glasgow Exhibition to the beautiful collection of medals by this artist in the sculpture-gallery there.

to these. The complaint and the tentative remedial prescriptions for it are alike on the spot. But the polluted Kelvin water is, after all, not the only exhibit of the kind here available. In Court 10, Messrs. Peter Spence & Sons, chemical manufacturers, Manchester, give a place within their case of general chemicals to a sample of Clyde water in full impurity as taken from Glasgow harbour. This unsavoury compound is contained in a large vessel of clear glass, and the examiner is thus enabled to arrive at an approximate estimate of the inherent degree of foulness present, which is unquestionably very great. These exhibitors also show, similarly bottled, Glasgow liquid sewage as sampled at one of the sewage outfalls on the line of the harbour. The river water is bad, black, and even inky, but, of course, the sewage sample is worse in all respects, although Glasgow sewage at all times is largely diluted with the crystal Loch Katrine, which forms the city's water supply. These highly illustrative exhibits are placed side by side, and immediately adjoining are two glass measures of equal size, containing liquids of comparative clearness, these representing similarly-drawn samples of Glasgow liquid sewage and Clyde harbour water after being cleansed by a chemical specific (aluminoferric), a patent of this firm. Into the merits, or the economical practicability, of the remedy, inquiry cannot here be made; but the illustrations are certainly most interesting, and, presumably, the exhibitors themselves are satisfied that their method is not only chemically sound but economically practicable. Mechanical appliances, also, for use in the sanitation of houses and other buildings, are forward in considerable force in this Exhibition. In Court 4, Messrs. R. Boyle & Son, London and Glasgow, show a great variety of ventilating contrivances chiefly in metal, particularly an improved form of their self-acting air-pump ventilator, for extracting foul air from houses, factories, ships, &c., without the unwelcome concomitant of draughts; a fixed weather-proof downcast ventilator, for maintaining a current of sweet air through the 'tween decks of ships; a system of draughtless railway carriage ventilation, &c. This stall is well worthy of a careful survey by all interested in the problems of interior sanitation. Elsewhere, also, over the building, samples of air-propellers are pretty numerous, and some of them are to be seen at work. In the lighting of towns, factories, &c., long a monopoly of coal-gas, some novel aspirants (other than electrical) have of late been making way, both in England and Scotland. Illuminating gas, procured by a simple and inexpensive method, chiefly from mineral oils of Scotch production, and used in the ordinary way, and even in the ordinary gas burners, has been the most prominent of the coal-gas rivals, and one or two municipalities (very small ones only as yet) in Scotland have, during the past eighteen months, ventured to adopt the system, to the exclusion of the older lighting agent. Two of these oil-gas contrivances are on show at the Exhibition, one by the Paraffin Gas-Lighting Company, Glasgow, and another by Mansfield & Sons, of Manchester. The former take their gas from the partially-refined mineral oil of the Scotch shale-field; the others are not particular, and will, it seems, supply themselves with gas from any cheap oils or fats readily procurable. A greater adaptability to circumstances has, it would appear, been developed since the new lighting mode was first announced. Oil-gas flame, as shown here, certainly possesses some points of advantage over that of coal-gas. The lighting power is as ample, while the texture of the flame is whiter of tint, softer and mellower, than that under ordinary circumstances obtainable from the municipal coal-gas supply. Mansfield's oil-gas, besides showing as an illuminant, figures also as a prime mover, and is here found at work driving one of Crossley's gas-engines, ordinary type. It seems assured that the new system requires only the simplest of plant, at a correspondingly moderate outlay, and is readily and safely handled by any craftsman of ordinary intelligence; and this being so, it may with advantage be applied to the lighting of mansions, villages, mills, and factories, out of the reach of a municipal supply,—or even to ships. In point of fact, oil-gas is now being used all over the country by consumers thus exceptionally placed; but, although it claims to be the cheapest in the world, even for towns, more than a doubt on the point exists. At least, one small gas corporation in Scotland, which over a year ago adopted the oil-gas system in high hope, has already felt compelled to revert to the old agent; this, however, cannot be held as conclusive, for failure in the particular case in point may have been due to lack of intelligence, or of some other essential, in applying the new method. Messrs. Braby & Co., London, also show their "Portable Sunlight" adaptation, which is another new departure in the use of oil as an illuminant under novel conditions. The portable sunlight machine is surely the largest of the race of lamps, and, as its name implies, it may be moved from place to place—carried or wheeled—without disturbing its bushy torch-like flame, which is obtainable, in the heavier sizes, at a strength up to 3,000 candle-power. This "lamp," or whatever it may be called, has already made rapid progress, having been found of special value at large open-air works, and other undertakings prosecuted at night as well as during the day, where the best possible imitation of daylight is required, and that at a reasonable cost. It is not at all dainty as to its food. Oils of little value for other purposes —refuse or residual oils, so to speak—may be employed with satisfactory results, and it is asserted that the largest of the various makes will do its duty well on less than three gallons an hour; the cost per gallon of the stuff used barely rising to the value of the smallest silver coin.

Archæologists would never dream of anything very specially interesting to themselves in the exhibit of the Tharsis Sulphur and Copper Company, from merely scanning the modest entry appertaining to it in the catalogue. This entry is confined to barely two lines, which indicate, simply, cupreous pyrites with specimens of the metals obtained therefrom, also a painting and model of the Tharsis mines. But the same mines were worked by the Phœnicians, Carthaginians, and Romans of old, and it is greatly to the credit of the directing managers to find that they have devoted quite a large portion of the stand space at their disposal to the ancient relics come upon from time to time since this particular mineral region became the property of an English and Scotch syndicate in 1866. These mines are situated about thirty miles inland from the Spanish shipping port of Huelva, and are believed to have been first worked ten or eleven centuries before the commencement of the Christian era. They have been drawn upon by various races almost continuously ever since, and the Roman galleries, which were of large extent, are still there for examination. The relics, as here grouped, consist of bits of ancient slag, both Roman and Phœnician; Roman grave-slabs, brick and tile specimens, cinerary urns, lamps, coins, and various articles in bronze, Roman clay mugs, tear bottles, &c. There is an oil painting of the north lode open-cast of the mines, which, although certainly of small merit as a work of art, answers well enough the illustrative purpose in view: and there is also what the exhibitors call a "model" of Tharsis. The latter is not really a model of Tharsis, but an orographic map of about six square miles of the company's territory there, roughly executed, but serviceable. The exhibits from the modern workings of these mines (Tharsis and Calañas) include samples of purple ore, burnt ore, cupreous schist, &c.,—all highly interesting to "the Copper Ring;" but these are clearly outdone in general interest by the ancient relics, although the latter were at first thought of as accessories only. In the same section, which is devoted to mining and minerals chiefly, there are two or three models illustrating the practice and outcome of mining operations at home. One is a representation, on a small scale, of a pit bottom, Legbrannock, Lanarkshire; but the leading example is that of a working face, full size, in the Ell Seam at Earnock Colliery, built up in a highly realistic fashion, with the effigy of a miner, pick uplifted, in the act of attacking the stratum in front of him. The representation is effective, but it might have been more so if in the "make-up" of the stuffed miner there had been more of adherence to fact and less of mere transpontine staginess. This rather "masher"-like collier resembles the real article as little as the ordinary stage mariner resembles the *bonâ fide* Jack aboard; but realism is partly vindicated in the huge masses of coal here built up into the semblance of a working place, for these have been carefully cut out of the seam itself. In the Artisan Section (Court 19) there are pit working models on a small scale, also a Firth of Forth coal-lading staithe, a Forth Bridge, and numberless other models,—for the most part amateurish, but worthy of regard when the necessary allowances are made and kept in view.

Of breakwater models there is a surprisingly scanty show. That of the sea-wall now being erected in Wick Bay,—the watery grave of so much engineering effort and outlay,—by Mr. James Barron, C.E., of Wick harbour works, is the chief, almost the only, specimen. It is placed in Court 4. Wick Bay is, perhaps, the most exposed spot within the circuit of the British coastline ever seriously contemplated as the site of a great breakwater. It is safe from two-thirds of the winds that blow; but a gale with anything of easterly in it, even a moderate gale, speaks of danger at once, and much life and a heavy tonnage of shipcraft, from first to last, have been lost there by the too sudden tumbling in of the excited rollers from the open. A breakwater, designed to be the backbone of a harbour of refuge, which it had been decided to construct there on a semi-national basis, was begun more than a quarter of a century ago, but after an enormous outlay, storm after storm brought utter ruin upon the undertaking, spreading the massive work along the deep bottom of the treacherous inlet, and leaving it more dangerous than before. The attempt was finally abandoned. The Wick Harbour Trustees are now engaged on some mitigation of the evil character of their bay, this time on a more modest scale, of course, and the design and composition of the principal feature of the works, the sea barrier, are here shown. The work is to be of Portland-cement concrete throughout, in top blocks of over 450 tons' weight, the base being protected from scour by sheet piling and a concrete apron, and the wall, when finished, will form one monolithic mass. Mr. Barron's model is on a scale of $\frac{3}{4}$ in. to the foot, and it serves its purpose well. Adjoining the breakwater are shown, by Messrs. W. C. Bergius & Co., Glasgow, numerous models of ready-fitting structures to be shipped to half-settled regions, and there put in position by unskilled labour. These include a roofed pier upborne on coarsely-pitched screw-piles for easy removal; a screw-pile pier, store, and dwelling-house for the Brass River; gable ends of Rio Scuno Custom-house and Olembo fortified stores; Borneo spice store; Rio Grande cradle or slip dock; Niger trading store, or granary, with skeleton roof; pier-head of a Calabar palm-oil jetty, &c. These models are all very rough, as, no doubt, are also the erections they represent; but as illustrations they are acceptable, and not a little interesting. Messrs. Head, Wrightson, & Co., of Teesdale Ironworks, Stockton, in Court 5, show a model, in type-metal, of one span of the eight-span "Empress" girder-bridge, by which the Indus Valley Railway is carried over the Sutlej. The bridge was built by them for the Indian Government, from the design of Sir A. M. Rendel. The same exhibitors also show one span of the Ibicuy Bridge, South Brazil, on the same liberal scale of $\frac{1}{24}$th full size; a hydraulic centre crane, with automatic compensating arrangement to meet fluctuations of load weight; and an interesting illustration, in model, of a hydraulic drop, representing a system for lowering wagons in blast-furnace plants, wherein the load is controlled by the hydraulic cylinder, and the cage is made to return by the action of the balance weights. These models are all in minute and well-finished detail, and the spacious stand claims and receives a large share of attention from experts, besides being closely looked at by the ordinary visitor.

In the transverse avenue, Messrs. W. H. Bailey & Co., Manchester, exhibit, in action, their patent turret clock on the lathe-bed principle, along with a large selection of recorders, tell-tales, gauges, testers, &c., covering about the entire field of inventions in regard to house, warehouse, and public-works mechanical registering and watching. Many of these are of striking ingenuity. Amongst the few exhibits of polished granite in the building, mention may be made of that by Messrs. D. H. Newall & Co., of Dalbeattie, Peterhead, and Rhode Island. Their specimen of American granite (Westerly) is much looked at, as partly a novelty; and they also show two pedestals in grey Dalbeattie, and two tazzas in red Peterhead,—all remarkably fine stones. A very effective exhibit is that of Messrs. D. & J. McKenzie, Glasgow, consisting of stucco and clay models, caps, cornices, friezes, enrichments, &c., in Court 4; and again in the transverse avenue, against the

wall, there is a display of patent golden lustre silk paper-hangings (Messrs. Cooke & Co.'s, Grove Works, Leeds) which claims the notice of all interested in house-finishing operations. One of the most brilliant of the sections, so far at least as mere colour is concerned, is that devoted to chemicals, paints, colours, and dye-stuffs, for the most part congregated in Courts 8, 9, and 10, adjoining the dome and main avenue. Conspicuous items in this section are three enormous crystals of alum, with an aggregate weight of about forty tons.

Out-of-door features not already mentioned are chiefly the switchback railway, which has been largely patronised; a military bridge across the Kelvin, used as a shorter route to the switchback; and a captive balloon with requisite terrestrial appointments. There is also a rink of imitation ice, on which the Scotch winter pastime of "curling" may be simulated by enthusiasts, if the enthusiasm be very strong indeed. The curling-stones are shaped and fashioned like the genuine article, only they do not slide along the rink, but roll over it on little wheels, something after the manner of the roller skate. On the whole, it is scarcely a diversion which commends itself in the hot temperature of midsummer, and the enterprising lessee is not overwhelmed with business. The Bishop's Castle and the interesting historical collection which it covers continue to attract streams of visitors, and the castle and its contents to many minds form by far the most powerful of the allurements of the Glasgow Exhibition,—but there are serious drawbacks. The ventilation is faulty, and when the crowd grows to a certain mark it is impossible to examine anything with any approach to comfort. Many visitors after crushing in are forthwith constrained simply to crush out again, trusting to a more convenient season. The plan of the old castle was not adapted for crowds at any time, and it is less so now, when the various chambers are filled with rows of stands. Stuart and other Scottish relics are here in a wealth and profusion never before achieved, and destined perhaps never to be repeated; but, over and above defective ventilation and cramped space, there is the added drawback of a poor light, and at the best these archæological treasures can be but imperfectly viewed. It is to be regretted that this fine collection had not been housed more appropriately elsewhere. The model of the grim old fortress possessed interest enough in itself to stand alone.

THE MINERAL AND INDUSTRIAL RESOURCES OF IRELAND:

THE IRISH RAILWAYS.

THE Institution of Mechanical Engineers is holding its summer meeting in Dublin this week. We extract the following from the address given by the President, Mr. Edward H. Carbutt, on Tuesday:—

The manufacturing prosperity of England is largely due to its mineral wealth. Unfortunately Ireland is not rich in minerals. The following figures of the mineral production, mainly in 1886, show how small it is, only 8,164 persons being employed in mining:—

	Tons.	Value.
Coal raised in 1877	140,000	—
,, ,, 1886	105,000	£42,225
Iron ore in 1886	101,000	15,241
Salt in 1886	31,000	14,151
Lead	241	1,428
Copper ore	26	283
Total produce in 1886 from mines	—	74,824
Slates, quarries, gravel, &c.	—	300,336

So you see only about 100,000 tons of coal are got per annum, and that not of the first quality. The Public Works Commissioners point out that coal is worked in Kilkenny within ten to twenty miles of three railways, and yet no branch line has been made to the mines; perhaps if railways were extended the mines might be more largely worked. The coal-mining industry is not a growing one, as it will be noticed that since 1877 there has been a considerable decline. Mr. C. De Rance, of the Geological Survey Office, informs me that the 4-ft. seam in the Kilkenny coalfield is almost worked out; this is the best coal, and can be sold for 20s. per ton. Dr. Edward Hull, in his book on the coalfields of Great Britain, states that the quantity of coal raised in Ireland is comparatively small, and much below what it ought to be if all the coalfields were properly developed. He has taken every opportunity to encourage coal-mining in Ireland. The districts of Tyrone and Antrim, he says, have considerable resources in mineral fuel; and he estimates the total available coal in Ireland at 182,280,000 tons. The seams are very thin, and it becomes a question how soon it will pay to work them. Only about 100,000 tons of iron ore are got every year, some of which is used for gas-purifying; the aluminous iron ore fetches 3s. per ton; the best 4s. per ton.

Concerning Irish railways, we have many sources of information. A Commission under the Duke of Devonshire reported on railways, including Irish railways, on May 7, 1867, and reported against State purchase, and advised that amalgamation should be facilitated. Then a Committee, appointed by the Chief Secretary for Ireland, reported on April 30, 1868, that if the Irish railways were all under one management 32,000*l.* a year would be saved. And this year we have the report of the Public Works Commission, under the chairmanship of Sir James Allport. Irish railways have been constructed partly by public money and only partly by private enterprise, 4,101,000*l.* having been advanced to them by the Government, of which 2,921,000*l.* has been repaid. In addition to the one million still to be paid, there is 115,000*l.* for overdue interest. Comparing the railways at the date of our former visit* with the present, we find that in 1865 there were seventeen railway companies with 1,838 miles of line, while in 1886 there were twenty companies with 2,615 miles. These figures, of course, do not include tram and light railways. The average increase has been thirty-six miles a year, and the total increase in train mileage and in gross earnings has been from 30 to 40 per cent. The net return on the capital in 1886 was slightly over 3½ per cent., or about the same as that earned in 1865. It would not be fair to compare the miles of railway in Ireland with the miles in England; but if compared with those in Scotland, there is one mile of line to every twelve square miles area and 1,800 inhabitants in Ireland, and one mile to every ten square miles area and 1,200 inhabitants in Scotland. Remembering that Ireland is largely agricultural, she may be considered not badly supplied with railways; for, in addition to the above total of railway lines, there are the narrow-gauge and tram lines made under the Tramways Act of 1883, namely, 162 miles open or under construction, costing 676,000*l.*, and 141 miles sanctioned but not commenced, costing 581,000*l.* Unfortunately, the break of gauge to 3 ft. has proved a disadvantage in these light railways.

It is satisfactory to note that Sir James Allport's Commission report that the condition of Irish railways has improved in the last twenty years in respect to finance, permanent way, and rolling stock. Their credit has improved, although it is not so high as that of English railways. The one thing in which no improvement has taken place is the rates and fares, and in some cases these have increased. As Lord Emly pointed out in the House of Lords, the third-class traffic tripled in England in fifteen years, while it hardly made any progress in Ireland. Reduction in fares and greater facilities for third-class traffic would prove an immense boon to the poor Irish tenant-farmers. The management expenses are so great in Ireland that the fares cannot well be reduced. There are twenty boards of management, with over 313 directors, for the Irish railways, with a total annual receipt of 3,000,000*l.*; while in England the Great Western Railway, with 300 more miles of line, is managed by nineteen directors, and has a total annual receipt of 5,000,000*l.* Not only are there so many directors in Ireland, but there is also separate management in every department on every separate railway; and what makes economy of working still more difficult is that many of the lines have separate stations in the same town, namely, Dublin five passenger termini, Belfast three, Londonderry three, Waterford three, Cork five. In the locomotive department there must be considerable loss, in consequence of not getting a full mileage out of each engine on short lines. The result is that the working expenses in Ireland amount to 55 per cent. of the receipts, in England to 53, and in Scotland to 50 per cent. If the Irish expenses could be reduced to the same proportion as the Scotch, there would result a saving of 140,000*l.* per annum.

In their recommendations Sir James Allport's Commission follow very much the recommendation of the Duke of Devonshire's Commission, that is, they report against State purchase, and in favour of amalgamation. They recommend the appointment of an Irish Commission with power to protect the public against abuse of the monopoly which would thus be left in private hands. Such a Commission should be located in Ireland, and should consist of four special members, who should be leading men of business representing different districts, and one Government representative. They should have power to arrange and approve amalgamations between existing companies, and also to obtain proper safeguards for the public. The Government should also have the power to call upon the amalgamated companies to make such extensions as may be required.

Speaking for myself, I trust that the Government will see their way to leave the railways in private hands. An amalgamated company, I believe, would save very much more than the 40,000*l.* a year, which is the saving from amalgamation as estimated by the Commission; and increased facilities and cheaper fares would be an immense boon to a comparatively poor country. One splendid example of what private enterprise has done in Ireland is furnished by Guinness's brewery; and the public show their confidence by buying the shares at 3¼ times the price of issue. I doubt whether Irish railways will increase much more. It must be remembered that Ireland is a small island, and that the cost of water-carriage is so very much less than of land carriage; consequently, where speed is not an object, it is cheaper to carry goods a longer distance by sea than by a cross-country railway. This does not apply to the transport of fish, &c., where speed is of importance.

I am indebted to one of our members, Mr. William Parker, Chief Engineer Surveyor of Lloyd's Register of Shipping, for the following particulars of cost of carriage by sea. Taking a modern cargo-carrying vessel, 275 ft. length, 37 ft. beam, 19 ft. depth, 2,127 gross tonnage, and 780 i.h.p.,, the paying load carried will be 3,160 tons. Such a vessel, driven at 9½ knots or 10·93 miles per hour, consumes 13 tons of coal per day. Taking the coal to cost 1*l.* per ton, this shows that 100 tons of paying load can be carried one mile for 3·52 lb. of coal, costing 0·377d., or less than a halfpenny for coal consumption; or for 7-8ths of a penny, including cost of working the ship and insurance. I cannot give what percentage ought to be added for dock and harbour dues and for management, and what for repairs and depreciation; but the shipowner has no land, stations, rails, &c., to pay for and maintain. The above figures apply to a full cargo, in the newest build of ship with triple-expansion engines, over a voyage from Antwerp to Bombay and back, which necessitated an expenditure of 1,225*l.* for Suez Canal charges.

To compare this with the cost of railway haulage, Mr. Tomlinson, one of our Vice-Presidents, has given me the following figures, taking full train-loads at a slow speed over a long distance. On a good road, with gradients about 1 in 350 varying, 40 lb. of fair average coal per train-mile will raise steam to work at from twelve to fifteen miles an hour a mineral train of 560 tons gross load, made up as follows:—

Engine	45 tons.
Tender	25 ,,
30 Wagons, each 16 tons gross load	480 ,,
Brake Van	10 ,,
Gross load of train	560 tons.

The paying load will be 300 tons, or 53·57 per cent. of the gross load. The consumption will therefore be 13 lb. of coal per mile per 100 tons of paying load. The coal used on the railway, however, will cost only 8s. per ton, against 20s. for that used at sea. Hence the cost of railway haulage per 100 tons of paying load will be 0·57d. per mile for coal.

The charges on railways are very heavy. The working cost may be assumed all round at about 50 per cent. of the receipts, and may be closely apportioned as follows:—

	Percentage of Receipts.	Pence per Train-mile.
General charges	3	1·5
Way and Works	8	5
Locomotive department	13	9
Carriages and Wagons	6	3
Traffic expenses	15	10
Law and Parliamentary	0·5	3·5
Compensation	1	
Rates and taxes	3	
Duty	0·5	
Total Working Cost	50 per cent.	32 pence.

* In 1865.

Hence, with trains such as that above mentioned the total working cost for hauling 100 tons of paying load would amount to about 11d. per mile. But railways seldom get full train-loads except when carrying coal. The increased speed necessary to work a mixed passenger and goods traffic also rapidly increases the expense of haulage.

Both marine and railway haulage are cheaper than horse or traction-engine haulage. Horse haulage, I suppose, would cost from 8d. to 9d. per ton per mile; and Messrs. John Fowler & Co., of Leeds, inform me that traction-engine haulage would average about 2½d. to 3d. per ton per mile.

It would be impossible here to give details of every industry, but as a last example the deep-sea fishery may be referred to. The estimated value of the fish taken in Irish waters amounted in 1886 to 640,000*l.*, while in Scotland it amounted to 1,397,000*l.*, and in England to upwards of 4,000,000*l.* Unfortunately, in Ireland it is a declining industry, for whereas in 1846 nearly 20,000 vessels were employed, manned by 115,000 men, now only 5,683 vessels, manned by 21,500 men, are so engaged; and, what is worse, only some 4,000 of these men are wholly employed in fishing. The Public Works Commission report that the appliances used in Ireland for deep-sea fishing are very deficient; that in the whole of Ireland there are only 600 boats above 30 ft. keel; and that many of these vessels are not decked, so that they cannot keep at sea in rough weather; also that there are no curing establishments, and that none of the nets are made in Ireland. They further state that deep-sea fishing as a national Irish industry can be profitably carried on only by the construction of harbours having sufficient depth of water for fishing craft at low tide; and they recommend the Government to spend 400,000*l.* on the construction of such low-water harbours.*

The Government have introduced three Bills for the drainage of land within the catchment areas of the Rivers Bann, Barrow, and Shannon; and they propose to make a grant of some 300,000*l.* out of the public purse for this engineering work. The object is to prevent the flooding of the land.†

THE METROPOLITAN BOARD OF WORKS INQUIRY COMMISSION.

FURTHER EVIDENCE.‡

Mr. George Brown, sworn and examined, deposed that he was the owner of two houses in Lisson-street, in respect of one of which he received a notice from the District Surveyor as to the dangerous condition of the party wall. When he went to see it he found Mr. Brick there, and told him to get the work done and he would pay half the cost. Witness was a member of the Board. Some time afterwards he spoke to Mr. Vulliamy about the matter, and asked him what was to be done. Mr. Vulliamy said, "Well, you must obey the order." Witness said he was prepared to do so, and Mr. Vulliamy then referred him to Mr. Thomas, of the Dangerous Structures Department. He denied that he had told Mr. Brick that he would get somebody from the Board to overrule or override the District Surveyor's decision. He did not meet Mr. Peebles (the District Surveyor) on the ground. Cross-examined by Mr. Studd, on behalf of the Inquiry Committee, witness said he had never made any payment to Mr. Thomas or any other official of the Board over this matter.

Sir Joseph Bazalgette, sworn and examined, said he was Chief Engineer to the Board, and had occupied that position for thirty-nine years, at least, in the service of the Board and its predecessors. He had been Chief Engineer of the Board from its commencement, and the whole of the engineering work and the engineering staff had been under his control. Having given some particulars as to the number and duties of the assistant engineers, the witness handed in a written statement prepared by him for Lord Herschell's information, describing the procedure in the carrying out of new works, from their proposal until their completion. Asked as to the method of dealing with tenders for works, the witness said that the tenders were deposited in a box on the Thursday afternoon before a Board meeting. They were either opened at the Board meeting, or they were opened by the Clerk before the Board meeting and handed to the Chairman, who announced them at the public Board. The lowest tender was not always accepted. Usually, inquiries were made as to the competence of the contractors, and if the results of those inquiries were not satisfactory, then the lowest tender was not accepted. Witness did not advise at all as to whether the tenders should be accepted or not. He merely stated whether the contractor had done work for the Board, and if so, whether he had done it well or otherwise; but the inquiry as to his condition was conducted by the Solicitors' Department. After the contract was entered into, the supervision of the work was looked after by one of the assistant engineers, by the district clerk of works, and by special clerks of works. The Board had a regular form for its contracts. A sum of money was usually provided for "extras,"—something like 10 per cent. upon the amount of the contract; and if, when the extras were measured, they did not reach that amount, the rest would be returned. It was an assumed sum to cover the "extras" and make the contract amount nearer to what the contract was likely to run to. Before any "extras" were paid, witness had to give his certificate. The assistant engineer measured up the work monthly, and received returns of "extras," and he allowed those which were clear, while those which were not clearly "extras" had to stand over for future decision. The contracts also provided for certificates from time to time for payment for the work done, which were approximate estimates of its value. The assistant engineer gave those certificates, but he (witness) was responsible for them. It was witness's duty, and that of all officers employed on the works, to see that the materials were of the specified quality. The contractors were paid monthly. When the work was completed the contractor sent in an account. The assistant engineer went through that account with the clerk of works, and made his corrections upon them. There were sometimes questions upon which they could not agree—for instance, as to what was included in the specification, and various other points of that kind, which were referred to witness. Witness then had the assistant engineer and the clerks of works, with the contract drawings and specification before him, and the contractor and his agents, and witness heard what each had to say, and determined the points in dispute. After that was done the account was sent to the Accountant, certified as to quantities, and the Accountant compared the prices with those in the schedule of extra works which was attached to the contract, and looked to the costs, and so forth, and eventually signed it as correct. Then he (witness), signed the certificate for the Board, and the contractor was entitled to his money. Since the time that the Board had been in existence, a great number of large engineering works had been carried out, to the amount of over 8,000,000*l.* The principal works of recent years had been the Embankments and the bridges. The larger contracts included the following:—In 1860, there was a contract with W. Webster for 310,000*l.* for the Southern Outfall Sewer, and one for 669,000*l.* with Mr. Furness for the Northern Outfall Sewer. In 1861 there was a contract with Messrs. Brassey, Ogilvie, & Hattison for 358,000*l.* for the Northern Middle Level Sewer, and in 1862 one with Webster for £395,000, for Crossness Pumping Station. Then in 1863 there was a contract with Webster for 237,000*l.* for the Southern Low Level Sewer; one for 172,000*l.* with Furness for the Northern Outfall Reservoirs, and one with the same contractor of 520,000*l.* for the Thames Embankment (North). In 1864, there was a contract for 247,000*l.* for the Thames Embankment (North) with Ritson, and one for 253,000*l.* with Webster for the Northern Low Level Sewer. Then in the next year, 1865, there was a contract for 293,000*l.* with Webster for the Thames Embankment (South), and in 1866 one with Webster for 120,000*l.* for the Isle of Dogs Branch Sewers. Then in 1867 there was a contract for 127,000*l.* with Webster for the Victoria Embankment wall; in 1871 another with Webster for 132,000*l.* for the Chelsea Embankment wall; and in 1872 two others, 130,000*l.* and 58,000*l.* respectively, for the Western Pumping Station buildings and engines, also with Webster. Then, in 1882 there were two contracts with Mr. Waddell, viz., Putney Bridge, 222,000*l.*, and Sewers, 140,000*l.* Then in 1886 there was one with Messrs. Williams, Son, & Wallington for the new Battersea Bridge, 143,000*l.*; and in 1887 one with Messrs. John Mowlem & Co. for the Northern Outfall Precipitation Works at Barking, amounting to 406,000*l.* Lord Herschell said he observed that Mr. W. Webster had carried out a very large number of these works; were his always the lowest tenders? Witness said he thought so.

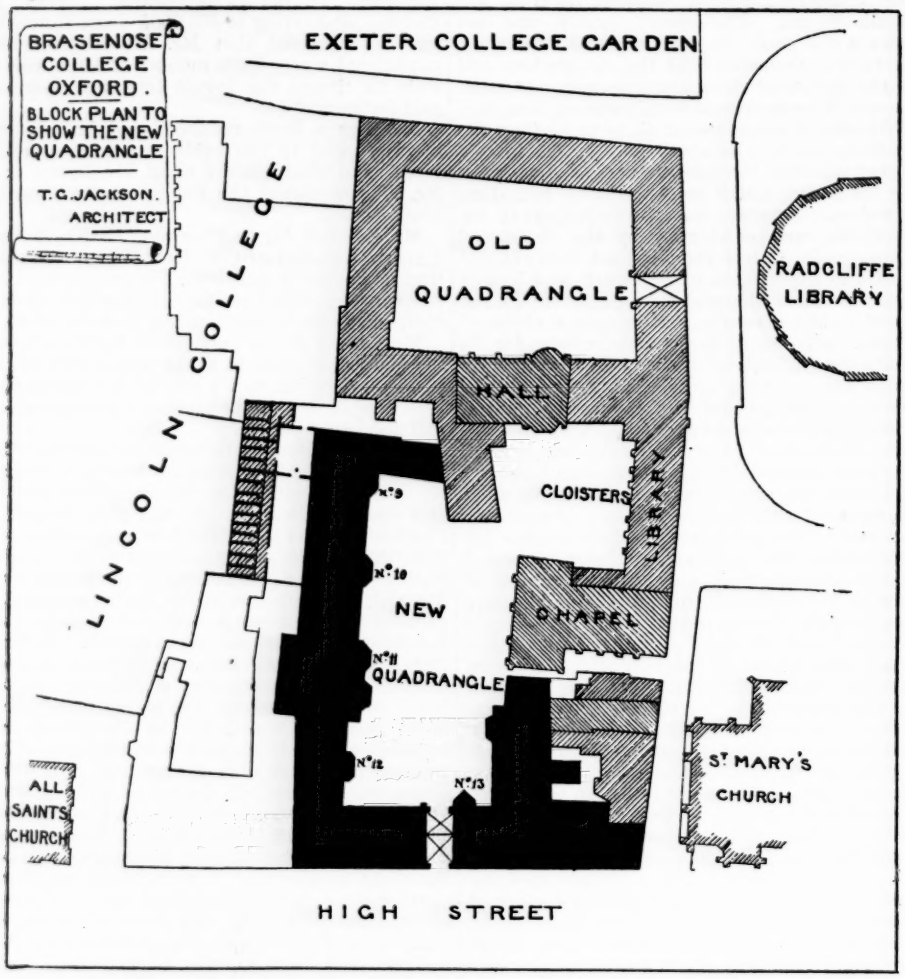
Mr. George Brick, recalled, said he adhered in every point to the evidence he had already given as to what passed when Mr. Brown and Mr. Thomas visited the dangerous structure in Lisson-street.

Mr. Edmund James Sherwood, architect and surveyor, corroborated the last witness, and said that he distinctly heard Mr. Thomas say that he was surprised that the District Surveyor should condemn the party-wall of Mr. Brown's house.

Mr. George James Thomas, of the Dangerous Structures Department of the Architect's Office, recalled, said that to the best of his knowledge he had never seen Mr. Sherwood on the premises in Lisson-street at all.

Sir Joseph Bazalgette, recalled, said that Mr. Furness was the contractor for that part of the Embankment which lies between Westminster and Waterloo Bridges. At the time that Mr. Furness's tender (520,000*l.*) was accepted for that work there was a lower tender by Mr. Ridley for the same work, amounting to 495,000*l.* Inquiries as to Mr. Ridley's financial position and character did not satisfy the Board, so his tender was not accepted. Messrs. Baker & Sons' was the next lowest tender. They were well-known people, and would have been very satisfactory contractors, and the Board accepted them, but in the course of negotiation with them they withdrew from the agreements. Then Mr. Moxon was the next lowest tenderer, but his financial condition was known to be unsatisfactory, and he failed shortly afterwards. When Messrs. Bakers' offer fell through he (witness) recommended the Board to re-advertise the contract, but after consideration they determined not to do so. Asked whether he had any financial arrangement with Mr. Furness, the witness said he had not. Sir John Rennie, he explained, had obtained a concession of a contract in Odessa. He (Rennie) had to carry out the contract within a given time. He had been in treaty with other people and had failed to do so, and he came to witness stating that he was prepared to part with the contract upon condition of his having 5 per cent. for the concession, and he said to witness: "If you will find me a contractor to carry this out, I will divide my interest with you," so that witness was dealing with Sir John Rennie with reference to a contract in another country, having no reference whatever to anything connected with witness's official position. Witness introduced Sir John Rennie to Mr. Furness, and Mr. Furness agreed to take the contract. An agreement was drawn afterwards that Mr. Furness should pay to Sir John Rennie one half of the commission on the concession and one half to witness; but witness's agreement was not with Mr. Furness, who would have paid the whole sum to Sir John Rennie. The date of that agreement was, he thought, 1860. Asked whether it was pending, or whether it had been completed at the time of the tender of Mr. Furness, witness said that early in 1862 Sir John Rennie made the proposal to him, and Mr. Furness's contract was in October, 1863. Witness had never received one penny from Mr. Furness under that arrangement, for when he (witness) found that it was thought that his having that connexion with Mr. Furness's work might interfere with his official duties, he at once relinquished his claim, and never received anything. The matter came to be considered through some litigation between Sir John Hare and Sir John Rennie, and to which witness was made a party. That was subsequent to Furness's contract. It was some one at the Board who suggested that witness's connexion with Furness might interfere with his duties. The fact that such an arrangement had been made was made public during the trial of the case in question, and witness was asked about it by the Board. As he found that there was a feeling that the affair might compromise his position, he relinquished all connexion with the matter. He forgot what was the amount he thus relinquished, but it was a large sum. Asked whether, in the carrying-out of the contract by Mr. Furness, he permitted any variations from what was required by the specification, witness said he could not speak from memory. He certainly permitted no variations as to the mode of filling-in the reclaimed ground. The ground was to have been filled in

* See last volume of the *Builder*, pp. 185, 315.
† See *Builder* for last week, p. 57.
‡ For summary of previous evidence see the *Builder*, pp. 8, 44, 66, *ante*.



Block Plan of Brasenose College, showing Extent of New Buildings.

by dredgings from the river, but the Conservators of the Thames did not carry on the dredging as rapidly as the Board's work required, and, therefore, filling-in material had to be taken from other places. Asked whether he had had any financial transaction of any kind with any of the other contractors for works carried out by the Board, witness replied in the negative.

We break off here for the present.

Illustrations.

NEW BUILDINGS, BRASENOSE COLLEGE, OXFORD.

THE new quadrangle which is being built from Mr. Jackson's designs at Brasenose College, Oxford, has been formed by the removal of several cottages in Amsterdam-court,—once the site of an ancient University hall,—and some buildings of timber and plaster of no antiquity, which contained rooms for undergraduates. The wing, which forms the west side of the new quadrangle, was begun in 1882, and has just been completed, together with the return wing on the north. These buildings contain twenty-two sets of rooms for undergraduates, one large set for a Fellow, and two large lecture-rooms, as well as a reading-room for undergraduates, and some additional offices connected with the College kitchen.

The quadrangle is now being completed by a south wing with a frontage to High-street, extending westward from the corner next St. Mary's Church, with a gateway and entrance-tower in the middle.

A new house for the Principal occupies the eastern part of the front and the return wing behind it. The interior will be handsomely finished with oak-panelled rooms and an oak staircase. The remainder of the building facing High-street, including the tower, will contain rooms for undergraduates and Fellows, and a muniment-room with fireproof floor in the upper story of the tower.

The general contractors for the first part of the new quadrangle were Messrs. Symm & Co., of Oxford, and for the succeeding part Mr. Willcock, of Wolverhampton.

The contractor for the present work, including the front and gateway-tower, is Mr. Dobson, of Colchester. Mr. Mockford is the clerk of works.

WENLOCK PRIORY, SHROPSHIRE.

THE two pages of details, &c., of Wenlock Priory, Shropshire, are reproduced, by permission, from Mr. T. Locke Worthington's recently-published book entitled "Remnants of Old English Architecture," of which a review appears in another column of our paper this week.

LODGE AND COTTAGES AT GREAT WARLEY, ESSEX.

THESE have been erected for Mr. E. Heseltine, of the Goldings, near Brentwood.

The material is concrete, of gravel dug on the spot, and selenitic lime, filled in between Burnetised Dantzic timber. The construction of the timbers of the Lodge is on a new system devised by the architect.

The lower stories are of brick, except in the case of the Lodge, where it is of concrete faced with neat pebble dash.

All the tile roofs are laid in concrete plaster on the architect's system.

The builder of the double and four cottages was Mr. I. R. Norfolk, of Warley; and of the lodge, Mr. J. Cross, of Hutton, near Brentwood. The ornamental plaster was executed by Mr. Walter Smith. The architect was Mr. Ralph Nevill.

OLD COTTAGE ARCHITECTURE.—III.

THE normal plan of an old cottage was a simple parallelogram, and in a future number I hope to give illustrations of some that are still unaltered. The lean-to's and return gables are generally the result of additions, and therefore to a certain extent of accident. The picturesque result from the skilful arrangement and grouping of roofs of various sorts is, perhaps, the chief lesson to be learnt from old examples, as modern plans can hardly be made to agree with the old.

I have given two views of the same cottage at Thorncombe-street, because of the peculiarly happy arrangement of the lean-to roofs. Notice should be taken of the projected weather-tiling in the upper example. Under this the tools of the tenant were hung. Lean-to's generally have the sides of oak board, which, grey with age, and covered with lichen, is of a very beautiful colour. Unfortunately, though landowners have learnt to appreciate the beauty of old tiling, this old boarding is generally condemned and sacrificed to the demon of tidiness.

The house at Nursecombe is of good character. There are some carefully-wrought pendants to the front barge-boards that I will hereafter illustrate. My sketches were taken some years ago, and the old barge-boards in the front have been replaced with very bad imitations. The central pair at the back are, however, original, and of a pattern common in the neighbourhood. The wing, with the outside chimney, I take to have been added at a somewhat later date to the original house. Some improvements were made to the windows when the house was recently repaired.

The cottage at Wonersh, with the recessed part, shows a favourite form in the old houses. There was probably another projecting wing on the near side of the recess. The view above Tangley Manor is of an inn, for which purpose the house was probably built.

Great Tangley Manor is the most important example of a timber house in this part of the county. A corbel in front bears the date 1582, and the whole of the front is doubtless of this date. The detail of the windows is very good, and all the corbels are richly carved.

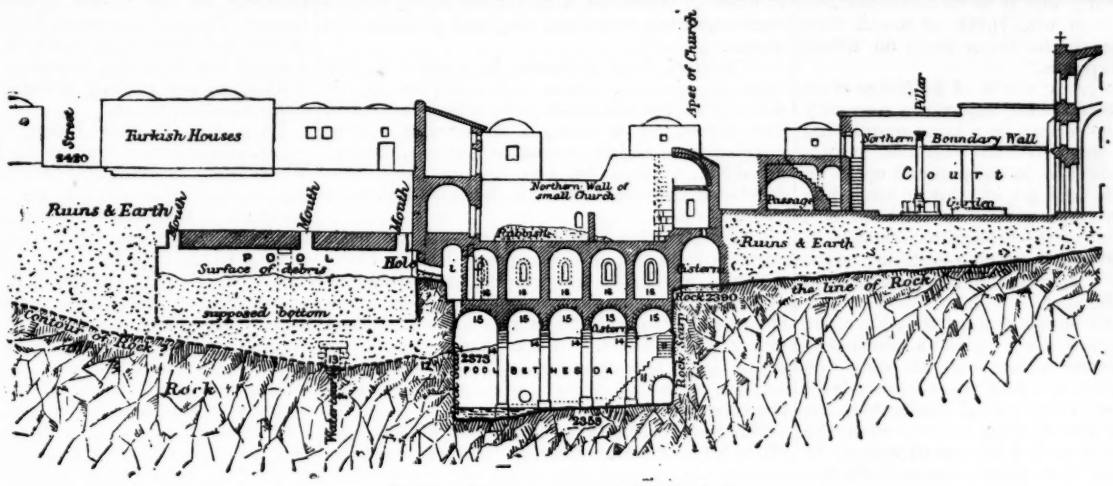
The ground has accumulated round the building so that it is sunk about a foot. Behind the front is the old fourteenth-century Hall, with its screen and a very fine and massive tie-beam and truss still remaining. The back roof shown in the sketch is that of this Hall. This is a good instance of a custom I mentioned in a previous paper, of cutting the old Halls into two heights by a floor and making the top parts into bed-rooms. The massive character of the truss saved it in this case from being cut away.

In Vol. IV. of the Surrey Archæological Transactions is a paper by the late Mr. Charles Baily, F.S.A., which gives an account of this roof, and the best general account of houses of this class with which I am acquainted.

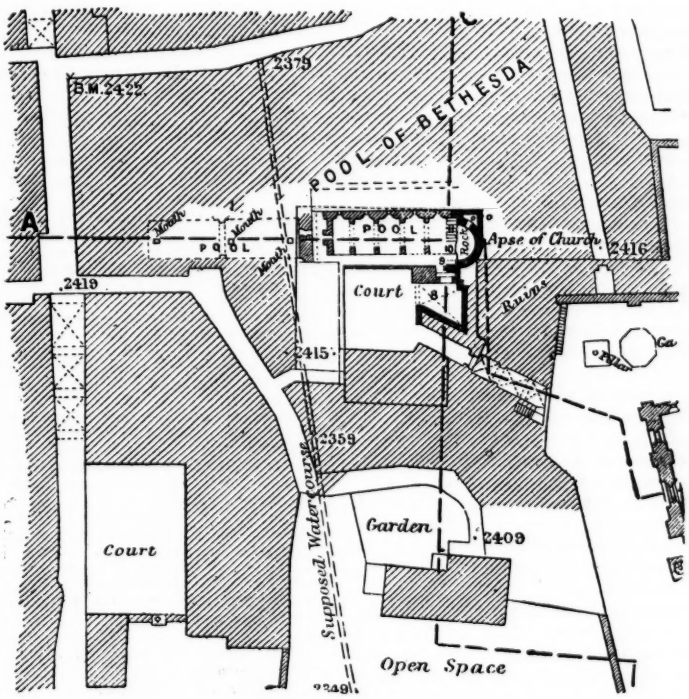
A few years ago Tangley Manor was in a sad state of neglect and decay, but has now fallen into good hands, and been admirably repaired and put in order without any interference with the old parts. The garden in front is enclosed with a fine stone and brick wall, with oval brick loopholes, and there is a moat all round that is now supplied with running water. The house was originally much larger. R. N.

British Medical Association. — The arrangements for the fifty-sixth annual meeting of the British Medical Association, in Glasgow, are now complete. The first general meeting for the transaction of business will be held on the morning of August 7th. On the following day the scientific work of the meeting, which is conducted by twelve sections, will be commenced. The public dinner of the Association will be held in St. Andrew's Hall on August 9th.

A Locomotive in a Quicksand.—One of the greatest difficulties of railway construction in the south-western States of America is the frequent occurrence of quicksands in rivers. In building the Kansas Pacific, and the Atchison, Topeka, and Santa Fé Railroads, according to Mr. H. L. Carter, railway contractor, there was frequent experience of this. From Western Kansas to the mountains, quicksands are to be found in nearly every stream, no matter how small, and to successfully bridge them required an expenditure out of all proportion to the width of the stream to be crossed. Pile-driving was tried, but the longest piles disappeared without touching the bottom. Then filling with earth and stone was attempted, and met with equally poor success, as the quicksands were apparently capable of swallowing the entire Rocky Mountains. The only means of crossing the rivers was found to be to construct short truss bridges across them. This was very expensive, but was the only thing to be done. As an instance of the practically bottomless nature of the quicksands, Mr. Carter cites the case of an engine that ran off the track at River Bend, about ninety miles from Denver, on the Kansas Pacific. The locomotive, a large goods engine, fell into a quicksand, and in twenty minutes had entirely disappeared. Within two days the company sent out a gang of men and a wrecking train to raise the engine. To their surprise, not a trace could be found of it. Careful search was made, magnetised rods were sunk to the depth of 65 ft., but there were no signs of the locomotive. It had sunk beyond human ken, and from that day to this the engine has never been discovered.—*Indian Engineer.*



Section showing "Pool of Bethesda."



Plan showing "Pool of Bethesda."

THE POOL OF BETHESDA.

The accompanying plan and section, reproduced by permission from a portion of the diagrams accompanying the last "Quarterly Statement" of the Palestine Exploration Fund, shows the plan and section of the supposed Pool of Bethesda, and its locality in relation to the church of St. Anne, the largest building in its immediate neighbourhood, a portion of which is shown at the right-hand extremity of the plan and section. The apse wall at the right-hand end of the "Pool" is the wall of a church of later date, which had been built over the five arches below. The arched recesses which appear to represent so well the "Five Porches" ascribed to Bethesda, are about 14 ft. long by 9 ft. wide.

THE "SHONE SYSTEM" OF SEWERAGE.

At the recent annual meeting of the Association of Municipal and Sanitary Engineers and Surveyors, held in London, a paper was read by Lieut.-Col. A. S. Jones, V.C., Assoc.-M. Inst. C.E., of Wrexham, entitled "Ten Years' Experience of the Shone System." In the course of the paper the author said:—

It is very nearly ten years since the Shone system was introduced to the world in a paper read by its inventor at the Congress of the Sanitary Institute of Great Britain, held at Stafford on October 3, 1878. . . . . .

Of course the lifting and propulsion of liquid or semi-liquid matter by compressed air automatically admitted and discharged, or blown off, by a machine called the pneumatic ejector, has always stood forth as the distinguishing salient characteristic of the Shone system, and the novelty and efficiency of that machine absorbed much attention.

But the ambition of the inventor led him to propound a complete system of sewerage and house-drainage on the most scientific sanitary principles, which principles can now be applied at reasonable cost, irrespective of any of the local conditions which, in the absence of Mr. Shone's invention, have rendered it difficult or too expensive fully to observe those sanitary principles.

He also provided an automatic flush-tank for the temporary storage and concentrated discharge of sewage, slops, or clean water, which has been usefully applied; but there is no other novel appliance in the Shone system, nor any departure from theoretical principles which have been laid down by other engineers.

The distinction between theory and practice is very great, and, where natural fall is deficient or absent, engineers have been sorely tempted to content themselves with sewers of deposit.

Economical considerations had also led to the construction of large tank sewers, with outlets closed for many hours every tide at seaside places, besides all the other lapses from a high standard of workmanship to which underground works are peculiarly liable, and it seemed high time for a reformer to cry out for a stricter approximation to true principles.

The advantages of a separation of rainfall and subsoil water as far as possible from sewage had only lately been fully admitted by the engineering world when Mr. Shone came on the scene, and perhaps some embers from the thirty years' strife waged by Phillips, Menzies, and others, on behalf of the separate system, were still alive. Consequently, it may not have been the most judicious course to introduce a new appliance by forcibly contrasting certain existing works with estimates of others which might have been designed in their place if the new invention had been available at the period at which those works were executed.

And the adoption of the separate system was no *sine quâ non* as regards employment of pneumatic ejectors; on the contrary, it was obviously against Mr. Shone's pecuniary interest, as operating to reduce the number and size of the ejectors which would be required to lift both sewage and rain-water together in the combined system.

But enthusiasm is not unknown among inventors, and Mr. Shone naturally desired to express the true theory of his system in as perfect a manner as possible. He therefore entered heartily into the advocacy of the separate system, because it would enable him to adjust the sizes of his pipes and their gradients to a more regular flow of sewage, and to show greater economy in the drainage of any town than would be possible under the combined system.

Mr. Shone, in fact, began with the careful compilation of a tabular statement of the discharge from various-sized pipes laid on different gradients, indicating at a glance those which would give a self-cleansing velocity approaching 3 ft. per second, and other particulars which should be calculated on in designing works of sewerage.

For this table alone much credit is due and has been accorded to Mr. Shone by many engineers, who refer to it with every confidence, and have found it practically useful.

The table contains two columns, which give the "population for which the pipes would be suitable at the various velocities, &c.," on the hypothesis that 15 or 25 gallons respectively per head per diem would be the measure of sewage produced by the population; and it has been erroneously assumed that Mr. Shone intended the theoretical figures set forth in one or other of those columns to be adopted in designing works, without reasonable allowance or practical margin, whereas he only intended to bring forcibly before engineers the startling divergence of ordinary sewerage from the true theory, and to suggest closer approximation to the latter.

But, independently of this misunderstanding, Mr. Shone has had to contend, from the very first, with the commonly-received doctrine that compressed air is a very expensive agent.

It would hardly be right to call that doctrine a prejudice, because it rests upon special facts, but it belongs to that class of fixed beliefs which are most prejudicial to early recognition of the value of inventions, which *at first sight appear to* set those beliefs at defiance.

Now the doctrine rests only on these facts, viz.:—

1. That, in all pre-ejector applications of compressed air, it has been used as a motor like steam to drive a piston, in rapid motion to and fro, in a cylinder.

2. That there is considerable waste of power, by the necessary generation of heat, in compressing air beyond three atmospheres.

3. That until recently air-compressing engines were defective in design and construction.

But in the Shone system the air itself is a slow-moving piston employed to lift the sewage, and its pressure need not exceed the limit below which the waste of power is of less consequence.

This should be obvious to any one who will take the trouble to understand the action of a

pneumatic ejector; but it is to be feared that there are still men who think or assert that Mr. Shone disputes the three facts on which their doctrine depends.

Engineers designing works of sewerage must often have regretted being under the necessity of leading all the sewage of a large undulating area by valley lines to some common sumpt, whence the whole has to be pumped up to an outfall (situated, perhaps, at a lower level than the source of a large portion of the sewage) simply on account of the prohibitory expense of establishing several pumping-stations, each requiring its own engine, boilers, pumps, and attendance on the spot.

And here in the Shone system they have the means of collecting each district's contingent of sewage by sewers at little depth below the surface, converging to a point on no lower level than that required to give good gradients to the short lengths of the district sewers, with the certainty that so soon as a regulated volume of sewage shall have been collected at such district centres it will automatically be passed on to the main outfall.

This is accomplished either by lifting and discharging, into a neighbouring gravitating sewer leading to the outfall, or through a sealed pipe which may follow the natural ups and downs of a road, and in neither case is the power expended greater than that which is sufficient for lift and friction, counting the lift only as difference of level between the district ejector and final outfall, instead of having to pump the sewage back again all the height from which it has gravitated to the single sumpt, as in the old system. It may be said, therefore, that the Shone system consists in the arrangement of such convenient districts, each with its own independent outfall in an ejector station to which proper gradients can lead the sewage through small self-cleansing pipes laid within a moderate depth from the surface, and in calculation of the air-pressure required to lift the contents of each ejector when full either into a gravitating sewer or through a junction with the common rising main to the common outfall.

The saving, in depth of excavation, thus effected may often cover the whole cost of ejector station and plant, and it only remains to keep up in any convenient place, central or otherwise, an air-pressure equivalent to the highest lift in the system to secure the regular evacuation of all the ejectors immediately on their being filled, and without loss of power, because reducing valves adjust the pressure applied in each case.

Mr. Shone's two chief opponents have lately acknowledged the advantage of this subdivision of the area to be sewered into independent districts, by proposing a similar arrangement with hydraulic instead of pneumatic lifting power, thus preferring, in point of fact, to employ four pistons and four cylinders to accomplish the end which Mr. Shone attains with two of each.

But it is not only the extra friction involved in a high-pressure* water-engine which conflicts with common sense as regards such a substitute for the pneumatic ejector, because the sewage which falls into the latter is expelled *bodily* from the bottom of the receptacle, so that no screening and accumulation of rags and heavy matter (which require constant attention at every sewage pumping-station) can take place, and the ejectors can be left for days to work under a public street without being visited, while the storage and removal of foul screenings from such a situation would be an intolerable nuisance as well as a cause of expense.

Then, moreover, all the water, after it had worked the hydraulic pump, would generally have to be pumped away like so much additional sewage, and the machinery and extra thickness of pipes for the much higher pressure of water than that of air must make the cost of installation much greater in the one case than the other.

And against these arguments we have only vague references to the loss by heat in compressing air supported by arithmetical calculations founded upon very insufficient data, and all this while practical men are constantly improving air-compressing plant with a firm conviction that the power can be produced so economically on a large scale (as in the case of the Birmingham Compressed Air Company) that it can be distributed at a profit to its producers, when paid for, by those who require to use it in place of steam as a motor for small steam-engines, at less cost than they can produce the steam.

A fortiori must economy be greater in the case of ejectors, since the compressed air directly moves the sewage by expansive force, and forms, as it were, a continuous elastic cushion from which successive portions, exactly equal in volume to the sewage they have displaced, are cut off and harmlessly blown away.

The distinction between direct and the ordinary *in*direct action of compressed air or high-pressure water (as respectively exemplified at Windsor Castle and Torquay) seems to make the Shone system much more economical than either of the others. In the ejector system *two pistons and two cylinders alone are employed, i.e.*, one of each for steam as prime mover and the other to compress air.

But in the old system, when the compressed air or high-pressure water, as the case may be, reaches the scene of operations, either agent has to move a third piston in a third cylinder, and finally we have the heavy pump plunger working as a fourth piston in a fourth cylinder, amid all the concussions of a solid body with an incompressible heavy fluid.

The valves may be the same for pump or ejector, with, however, this important difference, as to wear and tear in favour of the latter, that those for the pump must move over at least fifteen times more frequently than in the case of the ejector, for equal volumes of sewage lifted. We need not concern ourselves further with the recent controversy published by *Iron* on the Margate sewerage. At any rate the main object of this paper is to record the actual practical facts of the last decade, though it seemed desirable to open the matter with the above restatement of the Shone system, and to notice the bitter hostility it has encountered in one or two quarters whence it might have been least expected.

It is true that general assertions to the effect that "an enormous loss of power arises in the compression of air, as *the whole (!) of the power exerted appears again in heat*," and that 25 lb. or 27 lb. pressure was required to lift sewage 6 ft. on Mr. Shone's system, are palpably absurd, but when they emanate from an engineer who has made a reputation by his writings, and as an adviser of sanitary authorities, such bodies may well be falsely alarmed.

Borough engineers well know the difficulty of moving public bodies out of an old groove of practice, and can understand Mr. Shone's obligation, on the other hand, to all those public-spirited engineers and others who have seconded his effort to conquer that difficulty; but the fact is that the principle of his system is so thoroughly sound that nothing could upset it.

Eastbourne, under the influence of Mr. G. A. Wallis, C.E., and its Borough Surveyor, Mr. C. Tomes, made the first plunge with three large ejectors to drive the whole of its sewage out to sea at all heights of tide. This first installation was of course no adequate example of the system, but it established once for all the thorough efficiency of the pneumatic ejector as a remedy for tide-locked sewers, and its ability to cope with all the variations of flow due to the combined system.

Two miles and a half of large outfall sewer, which had all the inconvenience of an elongated cesspool backing up the flow of contributory sewers in the town, except at low tide, was at once entirely relieved, even at highest tide, by passing its contents through the ejectors to sea, and this improved state of things has been fully maintained for the last eight years.

But there remained certain low-lying areas in the town of Eastbourne, and the Sanitary Authority, fortified by experience, proceeded step by step to establish subsidiary ejector stations in these places to lift their sewage into the gravitating sewer, bringing the compressed air to work them by a pipe nearly three miles long from the original air compressors.

The first of these steps in advance of the original installation was taken in 1882, after two years' experience of the latter, the second in 1883, and the third is now in progress, all apparently supplied with power from the original air compressors, and the result of this healthy gradual advance has been to make Eastbourne a very fair example of the judicious application of the Shone system to remedy the necessary defects in one of the best examples of sewerage to be found in seaside towns as such works used to be designed ten years ago.

Mr. James Lemon, C.E., one of the earliest converts to the Shone system, and Mr. W. Gamon, Borough Surveyor, followed very closely on the first Eastbourne ejectors, by introducing a small one into the sewerage of Winchester, worked, as are railway brakes, by a Westinghouse air-compressor.

Then Mr. Thomas Longdin, Borough Surveyor, started two ejectors at Latchford, near Warrington, in 1882, and four or five years later applied two other ejectors for transmitting pail contents a distance of about two miles, thus effecting a great saving in the previous cost of carting to the depôt.

Mr. W. B. G. Bennett, C.E., followed with one ejector of 700 gallons capacity, for driving the effluent from precipitating tanks at Southampton against high tide, and two of 360 gallons each to lift from low-level sewers. A novel alternative use is made of one of these small ejectors to discharge the precipitated sludge from the tanks to other works one mile distant, and no difficulty has been experienced with either pail contents or sludge. Mexborough, Fenton, Campos (Brazil), Sacramento (California), Darlaston, Wednesbury, Compton Gifford, &c., followed suit with from two to five ejectors each, not to mention clubs, restaurants, &c., in London.

But in Beaumaris, on a small scale, and in the town of Henley-on-Thames, the Shone system is perhaps more fully carried out than in any other instance of its application *as yet completed;* and the following quotation from a pamphlet by Mr. F. Ball, ex-Mayor of Henley, shows how much it has given satisfaction:—

"Advantages were gained (by adopting the Shone system) which it will be well to enumerate.

1. Small sewer-pipes laid with good inclinations at no great depth, watertight, and mostly above the subsoil water level, discharging the sewage into an ejector, where it becomes effectually trapped.
2. The rapid transit of the sewage into an ejector before decomposition sets in.
3. Reduced cost for flushing when that operation becomes necessary, the small sewers necessarily being more effectually flushed with less water than larger ones would be.
4. Freedom from bad smells emanating from the manholes; for, the cubic capacity of the sewers being small, the volume of air in contact with the sewage is proportionately small also, and, being constantly changed through the rapid flow of the sewage, the latter cannot become stagnant and dangerous.
5. Less risk of the spreading of diseases; the noxious matters entering the sewers of one district not being in any way communicated to another.
6. The facility afforded of extending the system to new districts irrespective of levels in either.
7. The reduction in cost both in the initial outlay and in the working expenses."

Such testimony as this, after a year's trial at Henley, with a lift of 140 feet, must be very satisfactory to Messrs. Shone & Ault, the engineers, and Messrs. Hughes & Lancaster, the sole licensees of the patents, as all will acknowledge who know the difficulty, time, and money required to introduce a revolution in engineering practice.

But the careful investigation by a Select Committee of the House of Commons, which resulted in Mr. Shone's appointment as engineer to carry out a thorough reform of the sewerage of the Houses of Parliament, was a further guarantee of the worth of his system, and the impetus thus acquired is very great,—in fact, large works in Moscow, Rangoon, Lowestoft, Heston, and Isleworth, &c., show that a world-wide interest is now awakened, and among others the following engineers have either prepared or carried out, or are now preparing, schemes on the system,—viz.:—Messrs. Thos. & Charles Hawkesley; Messrs. Bateman, Parsons, & Bateman; Messrs. Bailey, Denton, Son & North; Mr. G. Stayton, M. Inst. C.E.; Mr. E. Pritchard, M. Inst. C.E.; Messrs. Gotto & Beazley, Mr. F. C. Stileman, C.E.; Mr. J. C. Inglis, C.E.; Mr. W. B. Bromley, C.E.; and Mr. J. C. Melliss, C.E.

The works undertaken at Rangoon, in British Burmah, are very extensive, and provide not only for removing the sewage of a population of 50,000, but for a high-pressure water supply to be maintained from the same air compressors.

These and other sewerage schemes now in progress will have a discharging capacity of about 8,600,000 gallons per diem, and the fact that several sanitary authorities in different parts of the world have let contracts to provide for that aggregate amount of work shows that the Shone system has gained considerable confidence.

But work actually performed is the basis of that confidence, and it has occurred to the writer to make an approximate estimate (on the basis of population sewered) of the sewage which has been lifted by pneumatic ejectors up

* Say 400 lb. the square inch as compared with air at 45 lb.

to the present date. This amounts to nearly 48,000,000 *tons* of sewage raised to heights ranging from 6 ft. to 140 ft.

Besides this, Mr. Bennett, C.E., estimates that nearly 5,000 tons of sludge have been moved one mile at Southampton; and Mr. Longdin, C.E., returns the quantity of excreta or pail contents as about 11,000 tons transported about two miles at Warrington.

Considering that four-fifths of the period of time, and a large amount of brain work and paper work have necessarily been expended in preliminary demonstration of the merits of the system, the above statement, of actual work done in moving sewage, can hardly be thought insignificant as the record of the first decade of the Shone system, while the number of ejectors already ordered and in progress is very large.

As an illustration of what the above figures mean, it may be remarked that the air-pressure employed on the above work would more than suffice to remove down to Sea Reach one-sixth part of the annual flow of sewage at present discharged at Barking and Crossness, *i.e.*, about 170 million gallons per diem for some sixty-three days.

The writer is not in a position so state the cost of the work done, or to compare it with that of lifting sewage in any other way; but the fact that so many different sanitary authorities, who have paid the cost, are generally satisfied with their experience is encouraging, and the time will doubtless arrive when some common basis of comparison may be agreed upon and results carefully noted.

Hitherto, however, so much heat and friction has arisen in argument between the advocates of low-pressure air and high-pressure water, on technical points such as the curves of adiabatic and isothermal compression, and on the efficiency of prime movers, that it is hopeless to look for speedy agreement to abide by the issue in foot-pounds and coal consumption, because wear and tear of plant would still form a bone of contention.

Under existing circumstances, therefore, the practical view of this problem must surely be "*Solvitur ambulando.*"

In the discussion which followed,

Mr. R. W. Peregrine Birch said that there could be no doubt that the Shone system had a very good champion and a very strong advocate in Colonel Jones. But he (the speaker) did not share the gallant Colonel's view that Mr. Shone was the introducer of self-cleansing sewers, or of sealed rising mains or drain-pipes. He (Mr. Birch) would very much like to see some figures showing the cost of lifting sewage by the Shone ejector, as compared with the cost of lifting by steam pumps, or pumps worked by gas-engines or other motors. He would also like to know whether the net average work done by the Shone ejectors at the Houses of Parliament exceeds what could be accomplished by ¼th of a horse-power if steam pumps were to be employed for lifting the sewage there. Without professing to have read all that had been said by Mr. Baldwin Latham in the controversy that had been referred to by the reader of the paper, he thought that Mr. Latham's views on the matter were sound. He (the speaker) believed that the Shone machine was an expensive and even extravagant appliance to use where only the mere pumping or lifting of sewage had to be considered.

Mr. James Lemon (Southampton) said that as his name had been mentioned in the paper, he should like to say that it was quite true that he was one of the earliest converts to, he would not say, "the Shone system of sewerage," which was a somewhat misleading phrase, but to the Shone ejector. The reason why he (the speaker) adopted the ejector at Winchester was that he wanted to put his pump in one place and his power in another place. Only by using Mr. Shone's pneumatic ejector was it possible to do this. In such exceptional circumstances only could the ejectors compete with the best kind of steam-engine and pumps. He agreed with Mr. Birch that it would have been desirable that the paper should have given some particulars of the cost of lifting sewage by the Shone ejector as compared with the cost when a good steam pump was used. As far as his (Mr. Lemon's) experience went, the Shone ejector was a costly machine as compared with good pumps.

Mr. E. Pritchard (Birmingham) said that as his name also had been mentioned in the paper, and as he had had considerable experience of the Shone system, he should like to say that he agreed with both of the previous speakers as to the comparative costliness of the work done by the Shone ejectors as compared with that done by good pumping engines of the best type. But, as had been said, the Shone ejector possessed great merits as a substitute for pumps in exceptional situations. If Mr. Shone had been a little extravagant in appraising the merits of the ejector, it should be remembered that Mr. Shone was its inventor, and that, like all inventors, he was an enthusiast. Personally, he (Mr. Pritchard) must acknowledge Mr. Shone's services in connexion with the elucidation of the sewage problem, and he could testify to the value of the elaborate tables which he had prepared—tables which he (the speaker) had found of great use, and in which he had not been able to detect any error. Although it was some time before he had felt justified in advising clients to adopt the Shone ejectors, he was glad to be able to say that where, under exceptional circumstances and to meet special conditions, they had been adopted, their use had been most advantageous to the districts concerned. But at the same time they must, as engineers, protest against the notion that the ejector could, under ordinary circumstances, be a competitor with the pump. There was inevitably and necessarily a loss of power by the use of compressed air, and to expect that compressed air could give us back all the power absorbed in compression was as futile as to attempt to solve the problem of perpetual motion. He thought that the term, "Shone system of sewerage" was to a great extent a misnomer. Self-cleansing sewers, which were claimed to be an integral part of the "Shone system," were no new thing: they had been attained to many years ago by such veteran sanitarians as Edwin Chadwick, Robert Rawlinson, and their disciples. But Mr. Shone deserved the credit, which no one grudged him, of having devised the ejector known by his name,—an appliance for lifting liquids, and which, though costlier in working than an ordinary pump, yet possessed exceptional advantages for special situations, inasmuch as it could be placed at a distance remote from the power which actuated it.

Mr. G. R. Strachan (Chelsea) spoke in support of these views.

Mr. E. G. Mawbey (York) said that borough engineers, and engineers to Local Boards and other authorities, often had reason to complain of Mr. Shone's methods of propagandism. No sooner was any scheme of sewerage proposed or prepared, than Mr. Shone flooded the place with pamphlets and other printed matter vaunting the advantages and superiority of his so-called "system." He was, no doubt, within his right, as a man of business, in doing this; but when he claimed that his "system" was as economical in cost and working as any other, and that it was equally suited for all situations, he was certainly going too far, and he often entailed upon the responsible professional advisers of public bodies a great deal of trouble in answering and refuting him.

Mr. Lobley (Hanley) said that as his name had been mentioned in the paper as having adopted the "Shone system," he wished to say that he shared generally the views of previous speakers; he did not regard the Shone ejector as being likely ever to generally supersede good pumping engines; but in special situations, and as an adjunct to existing sewerage systems, it had been found to be of great service, and notably so at Fenton, in Staffordshire.

Mr. J. Gordon (Leicester) said he came to the consideration of this question with a perfectly open mind; but how were they to decide upon its merits when such material particulars as cost of working were not given in the paper, only mere assertions? As practical men they did know what it cost to lift sewage or water by steam-pumping; what they wanted were figures showing the cost of doing the same work by the Shone ejector. As to the works carried out at the Houses of Parliament, at Eastbourne, and other places mentioned in the paper, was it at all certain that in some, at least, of the instances the work could not have been done as satisfactorily, and perhaps more cheaply, by the aid of good pumping engines? He thought that Col. Jones was not well-advised in placing himself so strongly in the position of an advocate.

Mr. Cooper said they were told that where the Shone system had been adopted there was a perfect immunity from smells, but that was hardly the case at Henley. And, whatever might be the explanation of it, the death-rate of Henley had increased since the "Shone system" was adopted. In 1886, before the Shone system was adopted, the death-rate of the town was 17·8 per thousand; in 1887, after the system had been applied, the death-rate rose to 19·7 per thousand. Now at Henley the sewage was lifted up a considerable height on to permeable ground, and it appeared to him (the speaker), from an inspection of Ordnance sheets of the district, that it was possible that some of the sewage found its way into the well-springs from which the water-supply was obtained.

Mr. Eachus (Edmonton), Mr. Hall (Torquay), Mr. Silcock, and Mr. De Courcy Meade (Hornsey) having each said a few words,

Mr. Ball, ex-Mayor of Henley, said that the smells referred to were in no way attributable to the Shone system, which had been adopted at Henley only after very conclusive demonstration that it was cheaper and better-suited for local requirements than any other system.

Mr. Fowler (Leeds) said that a great deal of the time occupied in this discussion would have been saved if Mr. Shone had, through Colonel Jones's paper, informed the meeting of the exact cost per unit of work of the Shone ejector.

Mr. Ellice-Clark, the President, in closing the discussion, said he stayed in Henley during the Regatta week, and a more stinking town he never was in, and he wrote to the Mayor and told him so. But he understood that Mr. Shone was not responsible for the way in which the sewers were ventilated. It was a great pity that the paper read by Colonel Jones did not contain more facts and figures in support of its assertions, Mr. Fowler had touched the keynote of the whole discussion. We wanted units for comparison, and without them no satisfactory conclusion could be drawn.

Colonel Jones, in reply, said that, as to the question of cost of working, it was hardly to be expected that the inventor of the Shone ejector, with his present limited experience of the use of that appliance, and with comparatively little data to go upon, would show his hand, or commit himself to any definite statement of cost, just at present.

NATIONAL ASSOCIATION OF MASTER BUILDERS OF GREAT BRITAIN.

The half-yearly meeting of this Association was held on Wednesday, the 25th ult., at the offices of the Liverpool Master Builders' Association, 6, Lord-street, Liverpool. Mr. Robert Neill, jun., was in the chair, and representatives from London, Manchester, Liverpool, Bristol, Birmingham, Bradford, Leeds, Nottingham, Wolverhampton, Cambridge, Bolton, Wigan, St. Helen's, Crewe, Lancaster, Huddersfield, Stalybridge, Lincoln, Hull, and Northampton, were present.

The following report of the Council was read and adopted:—

"*The Twenty-first Half-yearly Report.*
23rd July, 1888.

The Officers and Council beg to lay before the Members of the Local Associations and Master Builders and Contractors of the country, their twenty-first Half-yearly Report.

The Association now comprises the following local Associations and single members:—

Ashton-under-Lyne
Barrow-in-Furness
Birmingham
Bolton
Bradford
Bristol
Belfast (Dixon & Co.)
Cambridge
Cardiff
Crewe
Derby
Doncaster
Folkestone
Hull
Kidderminster
Lancaster
Leeds
Lincoln
Liverpool
London
Manchester and Salford
Northampton
Nottingham
Oldham
Portsmouth
Reading
Rugby
Southampton
St. Helens
Southport
Scotland Master Painters' Association
Walsall
Wolverhampton
Warrington
Wigan
Weston-super-Mare

As decided upon at the last half-yearly meeting, the half-yearly statements of hours worked, state of trade and supply of labour in the principal towns have been issued as follows:—One copy to each of the Council and six copies to each of the local associations, which show that though the building trade generally is still depressed, there is a slight improvement in one or two districts, and the supply of labour is abundant everywhere.

In Leeds the operative joiners and carpenters gave notice for an increase from 7½d. to 8d. per hour, and to reduce the working hours from 50 to

49½ per week. The employers offered to give the advance of wages of ½d. per hour from the 1st July, 1889, and to keep the hours the same as at present worked, but this was refused by the operatives, and the employers withdrew the offer. On the 1st of the present month the operatives struck work in five of the leading shops, but as there was no bulk of work going on in the town the employers decided to withstand the demand. The Leeds members therefore ask the members of Associations in other towns not to take on any joiners, and employ as few as possible during the pending dispute.

During the present session the Government have introduced a new Employers' Liability Bill, framed entirely upon the report of the Parliamentary Committee which sat last session. A joint Parliamentary Committee of this Association, the Institute of Builders, and the London Association, have had frequent meetings and prepared an elaborate statement of Amendments. These were laid before Mr. Matthews, the Home Secretary, on the 20th of April last. At this interview the deputation dwelt upon the injustice of many of the clauses of the proposed Bill, both to employers and employed, and urged Mr. Matthews to modify them. The Home Secretary gave the deputation a very patient hearing, and very courteously promised to consider the amendments. Since this interview the Chairman of the Parliamentary Committee has had frequent interviews with many M.P.'s.

This Bill has now been submitted to the Grand Committee on Law, and the Solicitor, Mr. Maton, has been fortunate enough to obtain the assistance of Mr. Stavely Hill (M.P. for Nuneaton Division), who has placed the whole of the amendments upon the agenda paper, and has given them his support; but your Committee regret to find that the Bill, as amended, and the draft of which is now before the House, is altered to such an extent as to render it very much more harsh than it was when presented to the Grand Committee.

The one clause which will bear very hardly on the building trade, and particularly in the provinces, is No. 9, which defines the compensation to be paid. The minimum sum to be paid is now to be 250*l.*, or three years' average wages of workmen in the same grade whichever is larger. In the Bill, as presented to the Grand Committee, it was 150*l.*

In Clause No. 14, a new sub-clause is introduced to define the expression "superintendence," but it leaves the matter pretty much as it was.

The Parliamentary Committee are much afraid that little is to be hoped for in the way of modification of the great hardships which this Bill will entail upon the building trade; but, at the same time, it is satisfactory to know that the trade unionists have not been able to induce the Grand Committee to make the Bill more harsh than at present drawn. Your Committee would point out the immense influence which the trade unionists seem to have in Parliament, and they would strongly urge the members of the National Association to interview the M.P.'s for their divisions, and, if possible, make them understand the aims and wishes of the employers.

The Iron Trades Employers' Association, the Agricultural Engineers' Association, the Cotton Spinners' Association, and other important organisations are using their influence to secure the same results.

As mentioned in the last half-yearly report, there has been no further action taken by the Trades' Union Congress on the eight hour question.

The Steam Engine and Boilers (Persons in Charge) Bill, which was brought into Parliament, has been withdrawn for this session.

The Bill as to the Rating of Machinery has been brought into the House by Sir W. H. Houldsworth and others, but during the present session nothing is likely to be done in the matter, but the question is about to be raised in another form by Sir Wm. Houldsworth's colleague, Mr. E. W. Tomlinson, of Preston, who has given notice of his intention to move in the House of Commons:—

'That the present state of the law relating to the rating of hereditaments containing machinery gives rise to great variations of practice on the part of valuers in different parts of the country, and is likely in the future to be the cause of much uncertainty and injustice; and that with a view of promoting uniformity and preventing excessive burdens being laid upon industries in which machinery is used, legislation is urgently required.'

The Council wish again to bring before the members of the local Associations the necessity of every employer of labour, whether sole or sub-contractor, covering their risk by insuring in the Builders' Accident Insurance (Limited), the cost of which is under ½d. in the pound of wages paid. The policies cover, not only the employers' own operatives, but workmen who may be hurt or killed through the negligence of the insureds' workmen at the same works. For 1s. per cent. additional premium the risk to the general public caused by the negligence of the insureds' workmen is covered.

These rates have been found by the Builders' Accident Insurance (Limited) to be sufficient, under ordinary circumstances, to cover the employers' risk under the present law, but when the new law comes into force they may possibly have to be amended.

The sub-committee appointed to meet the committee of the Royal Institute of British Architects upon the question of the Form of Contract have not yet been able to move in the matter.

The Council again urgently desire that members of the local Associations should do their utmost to keep up their Associations in a thorough state of efficiency, so as to meet any emergency that may arise.

The Treasurer submits his audited accounts for the past half-year."

It was resolved to hold the next meeting at Manchester.

In the evening the gentlemen attending the meeting were entertained at a banquet at the North-Western Hotel, by the President, Committee, and Members of the Liverpool Master Builders' Association; and on Thursday, the 26th, those gentlemen who could remain went with the members of the Liverpool Master Builders' Association for an excursion on the river, and after luncheon at the Eastham Hotel, through the courtesy of Mr. E. Leader Williams, the engineer, and Mr. Walker, the contractor, they were taken over the works of the Manchester Ship Canal, returning to Liverpool at 5 p.m.

BUILDERS' BENEVOLENT INSTITUTION.

The forty-first annual meeting of this Institution was held on Thursday, July 26, at Willis's Rooms, St. James's. Mr. H. H. Bartlett, President, occupied the chair, supported by Mr. George Plucknett, J.P., Mr. Thomas Stirling, and other gentlemen.

Major Brutton, the Secretary, read the annual report, which stated that the income had not been sufficient to maintain the charity, and it had been necessary to have recourse to the remainder of the Reserve Fund to meet the liabilities for the support of the pensioners. That fund was now entirely exhausted, and an urgent appeal was made for sufficient funds to carry on the Institution for the forthcoming year. Should that appeal not be liberally responded to, some of the funded property would have to be realised—a misfortune which well-wishers of the Institution would much regret. During the past year the Committee had only been able to recommend the election of two men, although there were several candidates, and three widows of pensioners had been placed on the pension list. The number of deaths of pensioners had been eight; the total number now on the funds being twenty-eight men and thirty-five women. To the President (Mr. H. H. Bartlett) the Committee offered their grateful thanks for the kind interest he had shown for the prosperity of the Institution, and it was with great satisfaction they were able to announce that Mr. J. Howard Colls would be the President for the ensuing year; and that the annual dinner would be held, with the consent of the Court of the Worshipful Company of Carpenters, at their Hall, in London-wall, on Thursday, November 29 next.

The report and accounts were adopted, on the motion of Mr. George Plucknett, seconded by Mr. Thos. Stirling.

Votes of thanks were passed to the President for the past year (Mr. H. H. Bartlett), to the Vice-Presidents, to the Trustees, and to the Treasurer (Mr. George Plucknett), who was again re-elected.

Votes of thanks were also accorded to the Committee, the retiring members of which were re-elected; and Messrs. W. Brass and G. Wall added to their number. A similar compliment was paid the Auditors (Messrs. Ward, Duffield, & Bolding).

The Chairman proposed as President for the ensuing year, Mr. J. Howard Colls, who, he believed, had the interests of the Institution at heart, and would do all he could to make his year of office a successful one.

The proposition was duly seconded and agreed to, and with a vote of thanks to the Chairman the proceedings terminated.

BUILDERS' CLERKS' BENEVOLENT INSTITUTION.

A special general meeting of the subscribers and donors of this Institution was held at the offices, 21, New Bridge-street, E.C., on Tuesday, July 31, Mr. E. C. Roe (of Messrs. Geo. Trollope & Sons) in the chair, in the absence of the President.

The Secretary (Mr. H. J. Wheatley) having read the advertisement convening the meeting, the minutes of the last general meeting were read, confirming the election of Messrs. J. Howard Colls, Thomas F. Rider, and William Robert Freeman (John Mowlem & Co.) as Trustees of the Institution, in succession to the late Mr. Benjamin Colls (who died some years since) and Messrs. Edward Conder and Arthur Cates, who have recently resigned. Three of the original Trustees, viz., Messrs. G. S. Pritchard, Charles Richardson, and W. C. Anderson (who were appointed at the foundation of the Institution in 1886) still retain office, and, together with the three gentlemen recently elected, make up the number of six trustees, as required by the rules.

The election of a pensioner (Mrs. Louisa R. Styles) to the Widow's Pension then took place by show of hands, the amount of the pension being £20 per annum. The election of Mrs. Styles makes up a total of seventeen pensioners now on the books of the institution.

At the conclusion of the business a vote of thanks was presented to the Chairman for presiding.

A CLAIM IN RESPECT OF "SHORT" QUANTITIES.

PRIESTLEY AND ANOTHER *v.* STONE.

This important case, as to which we published several letters in the early part of this year,* has now been before the Court of Appeal (the Master of the Rolls, Lord Justice Lindley, and Lord Justice Bowen). We take the following report of the case from the *Times* of July 31st:—

This was an action by builders against a quantity surveyor. The Rev. Reginald Tuke, who was about to build a Roman Catholic church at Chiswick, employed one Kelly as architect. Kelly prepared the plans and instructed the defendant, a quantity surveyor, to take out the quantities according to the plans. The defendant accordingly prepared a bill of quantities, had a number of copies lithographed, and handed them to Kelly. Kelly thereupon applied for tenders for the building of the church, and the plaintiffs, among others, tendered. Another tender was accepted for a certain sum. The plaintiffs brought this action to recover damages for injury caused by the alleged negligence and breach of duty of the defendant as quantity surveyor in preparing an inaccurate bill of quantities. The plaintiffs based their claim upon the ground that the defendant, by preparing the bill of quantities, represented that the same was correct, and would be sufficient for the building of the church according to the plans, and that it was the duty of the defendant to use ordinary care and skill in the preparation of the bill of quantities, knowing that tenders would be made upon the faith thereof. The defendant, in his statement of defence, denied that he was negligent, and said that there was no privity of contract between him and the plaintiffs, and that he did not owe any duty to the plaintiffs. He also denied that there was any inaccuracy in the bill of quantities, and alleged that the plans were altered after the quantities had been prepared. At the trial before Mr. Justice Stephen, without a jury, the Judge gave judgment for the defendant. The plaintiffs appealed.

Mr. Edwyn Jones argued for the plaintiffs; Mr. Spokes, for the defendant, was not called upon.

The Court dismissed the appeal.

The Master of the Rolls said that no such action as this had been known before the present case. The contract as to taking out the quantities was made between the architect and the quantity surveyor, and not with the builders. The surveyor was employed to take out the quantities for the architect, and handed them to him; and the surveyor had no control over the way in which the bill of quantities was used. The quantities might not be used at all, and they did not amount to a representation that they were true in fact. The architect could check them. If the bill of quantities were fraudulently made, the case might, perhaps, be different; but the case at the trial was not put upon this ground, and there was no evidence of any fraudulent or reckless statement. The quantity surveyor was not bound to conclude that the bill of quantities would be shown to anyone. The architect, in fact, might alter the quantities before sending them to the builders. This was an attempt to manufacture a new action which the Court would not sanction.

Lord Justice Lindley concurred. There was no privity of contract between the builders and the quantity surveyor. The custom relied upon as to privity between builders and quantity surveyors was not proved; and, even if proved, the custom would probably be held to be unreasonable and bad within the decision in "Bradburn *v.* Foley" (3 C. P. D. 129). It was there put upon the ground that the defendant, in effect, made a negligent representation to the plaintiff. The real truth was that the defendant was employed by the architect, and not by the builders, and there was no such representation. In his opinion there was no evidence of want of reasonable care.

Lord Justice Bowen also concurred. The action was without precedent. There were two fatal objections to the plaintiffs' claim—there was no privity between the plaintiffs and the defendant, and the defendant owed no duty under the circumstances to the plaintiffs, as duty would only arise

* See last vol. of *Builder*, pp. 50, 69, 70.

from privity. It was said that the defendant made a misstatement which he knew would be passed on to other persons, and that he was liable on the authority of "Peek *v.* Derry" (37 Ch. D. 541). In applying "Peek *v.* Derry" it was always important to consider the meaning of the word "statement." If a man made a statement as upon his own belief, he either believed it or he did not. If he believed it, the statement was true; if he did not believe it, the statement must be fraudulent. The decision in "Peek *v.* Derry" could not apply to such a case as that. But it would be otherwise if a man made a statement outside his own belief. A quantity surveyor was, of course, bound to take reasonable care in taking out quantities. But he made no representation that he had taken such care. He only represented that those were his quantities,—a statement as to his belief. Therefore, assuming that there was evidence of negligence in the defendant, it was not enough to render him liable to the plaintiffs. Even assuming that a fraudulent misrepresentation, or one so reckless as to be fraudulent, would render the defendant liable to the plaintiffs, that case was not put at the trial, and there was no evidence of it.

THE CHURCH OF ST. MARY-LE-STRAND.

Sir,—The drawings which you published last week of the steeple of St. Mary-le-Strand serve to draw attention to an unnecessary act of vandalism perpetrated on this interesting church a few years ago.

Messrs. Ketchlee & Hutchings have shown the vases in their proper places at the angles of the two upper stories. Alas, where are these vases?

When a scaffold was seen slowly rising round the tower a few months since, I, in common with many others, was in hopes that when it came down again it would reveal the vases replaced in their old positions, but we were doomed to disappointment; and, the scaffolding gone once more, the tower stands forth bare, and denuded of the ornaments which Gibbs placed there to serve a definite function, viz., to mask the set-back of the successive stories as they reduced in width towards the top, and to carry the eye upwards, just as in Gothic steeples a pinnacle or broach masks the junction of the octagon with the square and carries the eye from tower to spire.

Vases, as a rule, are doubtless not a very beautiful or commendable form of architectural ornament, but at least these served a purpose, and served it well, until, forsooth, one fine day, a small portion of one of them fell down, when, instead of repairing or replacing it,—a by no means difficult task,—they were all condemned, hewn down, and cast into the churchyard; and this latter was, I believe, a *very* difficult task, for they stoutly resisted the efforts of the iconoclasts, and in some cases only came down in pieces.

The fact that they are shown in your correspondent's drawing leads me to hope that they have not *yet* been broken up for concrete or otherwise disposed of, and if this is so why should they not once more be erected?

Let any one interested in the subject compare the steeple of this church with that of St. Martin's-in-the-Fields if he wishes to see the effect with vases and without, and I think he will come to the conclusion that much of the unfinished and forlorn aspect which St. Mary's presents is due to their absence. A Passer-by.

London, July 30th, 1888.

SCHOOL-BOARD TENDERS.

Sir,—Referring to the letter, signed "Heating Engineer," on p. 68 in your issue of the 28th ult., I am not surprised at all at the contents. The Board advertised for tenders for heating the new schools, Amiens-street, Battersea, and they were desirous of obtaining a perfect system of heating. We, with others, received necessary plans and elevations, and tendered on our own lines, and adopted our own system, since the system was left open to each party tendering. The time and cost to us on plans, &c., was about 15*l.*, but still we sent in our estimate, guaranteeing the perfect working of the apparatus, and were surprised to find some time after that the Board had accepted a tender hundreds of pounds below ours, the material alone costing us more than the amount of the accepted tender. The Board in many cases for heating make out their own specifications, and there is not one respectable firm who could carry the work out in accordance therewith and guarantee success. If the Board wish a perfect system of heating and ventilating, they can have it by paying for it; but not when their mode of working is rule of thumb.

One of the Firms Tendering.

Sir,—In reply to the letter of "Heating Engineer" in your last issue, no specification was provided, but the printed instructions stated that each scheme must comprise a detailed specification of the work and description of the system proposed, together with sketch plans complete, a guaranteed minimum temperature, and that "attention is directed to the fact that the school is planned for future extension."

Over forty tenders were sent in, some of them lower than the accepted one.

We think that the disparity in the figures is due to the fact that the important questions of temperature and the provision for future extension were left to the discretion of the firms tendering.

We fully concur in the opinion expressed in the editorial note, and would suggest that more definite instructions be given for future tendering.

J. Jones & Sons.

P.S.—The amount of our tender, including the pupil teachers' school and provision for future extension, was 547*l.* We calculated for an average temperature of 60° Fah.

DOWN-DRAUGHT IN DWELLING-HOUSE CHIMNEYS.

Sir,—May I, through the medium of your columns, ask for advice from some of your practical readers, under the following circumstances:—

My house is situated on the summit of a very high hill in Derbyshire, and in a very exposed situation. On a rough night we experience great discomfort from the tremendous noise which the wind makes in the chimneys. My rooms are 10 ft. high, and from the ground-floor to the chimney-head would be about 33 ft. The flues measure 14 by 9 (internal dimensions), and upon each there is a "wind-guard" pot. There are register-grates in two of the bedrooms, but the closing of these has little or no effect on the roaring-noise, which seems to proceed from the chimney-breasts. I am very rarely troubled with smoke.

If any reader will give me the benefit of his experience in such a case, I shall be greatly obliged. Is there any means of closing a chimney at the top when not in use? Boreas.

*** The roaring of the wind in a chimney which, as "Boreas" observes, "seems to come from the chimney-breast," is not caused by the wind blowing *down* the chimney, but by the blast passing over it setting in motion the column of air in the chimney, on the same principle as that which causes the sound of an organ-pipe, or (which is a more precise analogy), the shrill whistle produced by blowing over the top of the tube of a key. Hence wind-guards, the object of which is to prevent the wind blowing down a chimney, may have little or no effect in checking a sound induced by the wind blowing over it. We cannot suggest any remedy except covering the top of the chimney when not in use. We do not know of any implement made for that purpose; no doubt terra-cotta closed pots, like extinguishers, could be made, but the putting them on and off would be a troublesome business.

The Student's Column.

ARTIFICIAL STONES.—V.

Stones formed from Plaster of Paris.

THIS section deals with those expedients which have for their object the treatment of plaster of Paris casts, &c., so as to render them harder, more stone-like, and durable.

Plaster of Paris is obtained by the dehydration of natural gypsum at a temperature of from 110° C. to 120° C. If heated much above this the substance loses a good deal of its facility of combining with water, and consequently does not quickly harden.

A mode of obtaining dense translucent alabaster-like casts is to use plaster that has been prepared at 500° C. The combination with water takes several weeks, but with the above result.

The facility with which ordinary plaster casts may be obtained is largely discounted by their porosity and softness, which renders it practically impossible to preserve them clean and sound in exposed situations for any length of time. Consequently a large number of proposals have been made for the superficial hardening of such casts. J. Penwarne, in 1809, was the first inventor who worked in this direction, and his process consisted in the immersion of the articles in a strong solution of alum for from fifteen to twenty minutes, subsequently suspending them over the bath until crystallisation began, when they were "basted" carefully with the solution from time to time. When well crystallised all over, the casts were rubbed smooth with sand-paper. The action of the alum here is chiefly mechanical, by closing the pores of the cast with crystals; but also apparently, to some extent, chemical, possibly by the formation of a double salt of sulphate of potash (alum is a double sulphate of potash and alumina) and sulphate of lime.

In the manufacture of the artificial marble termed "certaldite," the plaster of Paris article is first well dried, to expel all uncombined water, and, after very careful cooling, immersed for twelve hours in an indurating bath, which may be composed of a variety of materials, such as salts of magnesium, carbonate or sulphate of potash or soda, sulphate of iron or copper, or, in fact, almost any saline or acid mixture that will not decompose the plaster, and is capable of imparting hardness to it. A favourite mixture is one of oxalic acid and alum or of oxalic acid and sulphate of iron, and when coloured marbles are desired, the colours should be added to the indurating bath. Another patent by the same Certaldo Marble Company relates to the treatment as described of the native gypsum cut to the desired shape.

Although the hardening of gypsum and plaster by alum is partly accounted for, as already mentioned, by the property which sulphate of lime possesses of forming double salts, the action of many other salts and acids does not seem quite so clear. It is probable, however, that the oxalic acid solution may be useful in precipitating oxalate of lime in the pores of the plaster by the decomposition of the sulphate dissolved by the water in contact with it. Bitartrate of potash, again, another salt that has been largely used, acts by the production of tartrate of calcium and sulphate of potash, which latter will unite with another portion of sulphate of lime forming the double salt.

When desiring the production of plaster casts possessing the maximum of hardness that untreated plaster will attain, the observation of Gay-Lussac should be borne in mind, viz., that the hardest natural gypsum produces plaster that yields the hardest casts.

Dr. Reissig's methods of hardening and preserving casts, which obtained a few years ago the prize offered by the Prussian Government, involve the soaking of the articles in a solution of barium hydrate (baryta water), or in a solution of silicate of potassium. In the first case the baryta decomposes a portion of the sulphate of lime, forming the more insoluble sulphate of barium, hydrate of lime being at the same time formed, which, absorbing carbonic acid gas from the atmosphere, ultimately becomes converted into carbonate. The silicate of potassium acts by the production of insoluble enamel-like silicate of lime, the sulphate of potash simultaneously formed uniting with sulphate of lime. In both processes the articles are finally treated with an alcoholic solution of soap.

Bruce Joy and Lewen's method, patented in 1884, is one for the production of imitation marble by immersing the cast (formed of a mixture of from 15 to 20 parts of plaster to 1 of zinc white) in refined linseed oil for six or seven days. It is then taken out and allowed to stand in a warm place for four or five days, and finally given a coat of flake white in refined linseed oil.

The Liverpool Water Supply. — At the meeting of the Liverpool Water Committee, on Monday last, Mr. Parry reported that the stock of water at Rivington had increased to 1,280 million gallons, and the Committee decided to increase the hours of supply in the city and Bootle to twelve hours per day, and in the suburban districts other than Bootle to eighteen hours per day. The alteration took effect on Wednesday.

Rendering Walls Waterproof. — The *Wiener Gewerbe Zeitung* advocates the following method for rendering brick walls impervious to moisture. It consists in giving the wall several consecutive coatings, first with soap and water, and secondly with water and alum, the proportion being 300 grammes of soft soap to a litre of water, and 200 grammes of alum to the same quantity. The walls must be very dry and clean, and the temperature of the air not below 8 deg. R. The soap-water is first applied boiling hot with a brush, and in twenty-four hours this coating is hard and dry. The alum-water is then applied, its temperature being from 16 to 17 deg. R. Twenty-four hours later the process is repeated, and afterwards twice or three times more. Should the walls be particularly exposed to wet, as for instance sea-water, the process should be repeated a few times more.

Books.

First Elements of Experimental Geometry, applied to the measurement of Length, Breadth, Area, and Volume. By Paul Bert. Translated from the French, with additional questions and exercises based on the lessons. London, Paris, New York, and Melbourne: Cassell & Co.

THIS is a charming little book, written by its late accomplished author with the object of rendering geometry an attractive study to very young learners. In the preface the author says that having been often surprised to find how little taste the children in elementary schools have for geometry, he came to the conclusion that it was owing to the way in which the first notion of the science of mensuration was usually presented to a child, with catalogues of definitions in conventional language which conveys no idea to the childish mind. "A point has 'no dimensions,'—a philosopher will understand the definition, but not a child; 'no magnitude,' and to prove it, the master chalks on the blackboard a white spot as big as a sixpence. . . . Of what possible interest can it be to a child to learn to describe a circumference touching the three angles of a triangle? Or to divide a line? A time comes, no doubt, when all this may become interesting; but as he meets with these enunciations and demonstrations in the course of his lessons the pupil sees no use in them, and merely learns them mechanically by rote."

This criticism is, of course, equally true with regard to the commonly-accepted ways of teaching a great many things. Children are taught rules of which they do not see the bearing, and are told "they will see the use of it when they are older." The intelligent child wants to see the use of it *now*, and would pay attention and be interested if anyone would take the trouble to tell him. This is what Paul Bert has done, and done admirably, for geometry. You want to find out how far off that stick at the other side of the pond is from this tree here? And the author shows them how it may be done, not with mathematical, but with fair practical accuracy, by taking a base line on this side of the pond, and sighting along two sides of a piece of paper folded, after some experimental trials, into the right triangular shape; a kind of childish substitute for the theodolite. "This little figure, with three sides and three angles, is a picture or copy on paper of the big figure or triangle A B C drawn upon the ground." And he goes on to show that as we know the length of one side of the big triangle, and the same side in the little picture is 1-36th of the reality, and as by sighting along the two edges of the triangular piece of paper to the distant point and the near point we have got the angle and the shape of the triangle and the right proportion of the other two sides, the sides of the big triangle are in the same proportion to its base. Or does the child want the height of a tree? We show him how to get it with a right-angled isosceles triangle of card, the lower edge held level with the ground and the eye sighting the top of the tree along the hypothenuse, and then—

"Make a mark on the ground just where your feet stood. Now take the yard measure and find the distance between the mark you have made and the tree. The height of the tree will be exactly equal to that distance added to your own height, or rather the height of your eye from the ground. It is done now, you see. The distance is 18 ft. 9 in., your height is 4 ft. 3 in.; 22 ft. 8 in. therefore is the height of the tree.* Easy enough to do, is it not?"

Only the author does not, at this point, use any such hard words as "hypothenuse" or "isosceles." His lessons are illustrated by realistic little sketches. In this way of learning a child really sees that he is learning to find out things that may be of use, not merely playing with words and figures on a slate or a piece of paper. The ordinary definitions are gone into later on, when the pupil has learned to know something practically of what he is dealing with.

The book is one which ought to be most useful in teaching the elements of mensuration to the young, and indeed may be useful reading for many older people who have never had an idea on the subject, of whom there are not a few outside the ranks of the professions for which geometrical knowledge is more or less a necessity.

* We presume that four inches is subtracted, as the distance of the eye below the top of the head.

Mathematical Drawing Instruments. By Mr. William Ford Stanley. Sixth edition. Published by the Author at 5, Great Turnstile, Holborn, and by Messrs. E. & F. N. Spon, 125, Strand.

Mr. Stanley's practical knowledge of the construction of mathematical instruments as a manufacturer has enabled him to produce a book of the highest value to those who have to use these instruments. In this book we find mathematical, drawing, and measuring instruments; their construction, uses, qualities, selection, preservation, and suggestions for improvements, fully described. A table of contents is provided at the beginning, and an index of instruments under their technical names is added at the end of the book. A natural prejudice in favour of the author's own improvements, the result of a life devoted to his work, and a desire to aim at perfection, has led him to give due prominence to his own instruments, but the work can be accepted as a useful guide to the student, independent of the maker he employs, though such names as those of Messrs. Elliott, Messrs. Adie, Messrs. Casella. Messrs. Troughton & Simms, and Messrs. John Davis & Son ought certainly not to be omitted in speaking of mathematical, drawing, and measuring instruments.

As stated by the author, our first ideas of mathematical instruments do not extend beyond a case of drawing-instruments; but we have only to refer our readers to our "Student's Columns" of last year to show how extensive the subject becomes when surveying instruments are added; and even when limited to drawing instruments, the author shows that there are many instruments very little known and not generally understood, that are worthy of attention. We are glad to see that the author, upon p. 3, emphasises the importance of purchasing good instruments. It is the greatest fallacy to suppose that *any* instruments will do for a beginner—a learner requires the very best instruments. When he has learnt the use of the instrument, and understands its adjustment thoroughly, an inferior article may serve his purpose, but certainly not for the purpose of studying his subject. Hence cheap second-hand instruments for a beginner should be avoided. The author's recommendation of fluid colours upon p. 311, and his condemnation of liquid Indian ink on p. 15, we entirely agree with. Indian ink requires to be rubbed fresh every day for nice work, and to be re-mixed every day when not washed out of the palette for ordinary work. Even then the old ink will not re-mix satisfactorily after the third day. The stick of Indian ink should be carefully wiped with a duster before the stick is laid down, otherwise next time it is used the ink will become gritty. Colours, on the contrary, when used in cakes as sold for mixing water-colour tints, should not be wiped, but placed upon their dry edge for the wet edge to dry. It is very wasteful to dry them with a cloth or duster. It is so often found expedient to mix more colour than is used, that the liquid colours recommended by Mr. Stanley for use in professional work are very economical.

Needle-points for drawing instruments are strongly recommended by the author, who has done much to improve the attachment of the needle to the instrument. Needle-points are excellent, except for "dividers," and "spring bow dividers" should never be used with needle points. The same objection applies to needle-pointed dividers as to the road-pencil illustrated upon p. 19, namely, that it is difficult to maintain the points evenly apart. They are apt to shift, and, in the case of a road pencil, the points vary as the pencil wears down. The author's improved hair-spring connexion, shown on p. 30, and his inner nib to the dotting pen, on p. 21, are very good. The inner nib could also be applied to a large pen for ruling thick lines on a diagram, or for border-lines. Knife keys are now seldom used. The author's template keys for brick dimensions, on p. 32, and his calliper compasses, on p. 33, are worthy of commendation, the latter, with the addition of a vernier, would be especially useful. Faber's leads, which Mr. Stanley adapts so many of his instruments to fit, are, as stated, "regular in size, and sufficiently firm to bear clamping tightly."

The author's remarks upon double-jointed compasses are very proper. Neat work can only be produced when the instrument used for drawing moves at right angles to the paper. The old-fashioned lengthening-bar to compasses is now seldom employed. For circles having a radius larger than can be struck with an ordinary compass, tubular compasses are found to work very steadily. They are complete in one piece, and do not require any loose parts. For circles with a larger radius than the limits of a tubular compass will set out, beam compasses are the best, those described by the author on page 61 being especially excellent. Several elliptic instruments, such as the "Oograph," described by the author on page 83, are very ingenious, but are not likely to be much in request. The remarks upon page 88, chapter xii., relative to the application of the parabola to scientific work, might have been omitted. They are foreign to the subject of the book, and much more might be said to make their purpose clear.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

8,917, Cowls for Chimneys. T. S. Truss.

According to this invention, the force or action of the external air is employed to eject the smoke or air from within. The injectors are also constructed so that the external air from the injectors passes over the flues on or over which the injectors are fixed. An elaborate specification describes the method of construction of the ejector and the injector; the principle is, however, that of receiving and ejecting chambers with curved or bent-mouthed inlets and outlets.

11,508, Opening and Closing Fanlights, &c. R. R. Harrison.

A vertical screw is by this invention carried by a fixed bracket and is made to revolve by a pulley at its lower end, which is operated by a cord running over guide pulleys carried by lugs attached to the same bracket. The opener can be used either vertically or horizontally, and two sashes, lights, or frames may be moved simultaneously in the same direction from the same motion by attaching two links to the screw nut.

3,001, Securing Door-Handles. W. Johnson.

This invention consists in fitting the knob to the spindle by a longitudinal dovetail connexion, so as to ensure a permanently tight fit of the spindle in the socket of the handle, and prevent play of the handle in any direction. A dovetailed tenon in the socket of the handle fits in a longitudinal dovetailed groove in the spindle (or *vice versa*) in combination with a cross-pin, set screw, or other means of preventing longitudinal motion of the knob on the spindle. The latch follower is also affixed by similar means.

7,354, Construction of Iron Buildings. L. S. Buffington.

This invention relates to fire-proof buildings composed chiefly of iron, and the objects are: (1) The construction of an iron building in a manner that will practically obviate undue expansion and contraction during extremes of heat and cold; (2) A novel construction and arrangement of the main structure and of the stairs and elevator shafts, whereby there is attained the necessary strength and stability together with a compactness, and the utilisation of the space to the best advantage; and (3) An improved plan of floors and means of bracing the iron beams in fire-proof floors in such structure. Details with this end in view are shown in several sheets of drawings accompanying the specification.

7,751, Improved Window-sill. H. Breuer and Others.

The sill which is the subject of this patent is made in metal, and is designed to be strong and durable, and when set in place to present a neat finish, and to effectually exclude rain, dust, or snow from the building. It is formed with a sloping ledge or plate, and an ornamental or moulded front pendent portion, which projects below the plate in the front of the building.

7,774, Stays for Casements, Fanlights, and the like. J. G. Dunn.

The improvements which are the subject of this patent consist in providing an arm attached at one end to a stationary part and at the other end to a moving part, with a centre joint consisting of enlarged discs, having teeth or projections thereon, which lock into each other. It is operated by a spring or screw or similar mechanism.

7,792, Sliding Doors. A. H. Ford.

The sliding doors are hinged or otherwise attached to a sliding jamb, and the invention is intended to be used principally in the manufacture of wardrobes, the object being to enable such doors as are lined with looking-glass to be so arranged that a front, side, and partial back view of the person to be seen.

NEW APPLICATIONS FOR PATENTS.

July 20.—10,501, B. Jones, Tipping Carts, &c.—10,514, T. Neal & W. Moyle, Securing Edge Tools to their Handles.—10,515, J. Auth, Window-Glass Setting.—10,525, A. Boult, Water and Fire Proof Floors, Ceilings, Roofs, &c.—10,527, A. Boult, Machines for Lifting and Delivering Bricks, &c.—10,532, F. Geuth, Water Closets.

July 21.—10,544, F. Winser, Flushing Tanks or Cisterns.—10,550, J. Pullar, Safety Lockfast Gear for Actuating Fanlights.—10,568, F. Royce, Electric Bells.—10,580, W. Thompson, Hinges.—10,586, A. McLean, Blocks or Slabs for Paving, &c.

July 23.—10,614, J. Howorth, Self-acting Propeller-Ventilators.

July 24.—10,662 and 10,663, A. Tite, Burglar Alarms.—10,669, G. Herdman, Asphalt for Pavements, Buildings, &c.—10,673, R. Wright, Self-locking Window-sash Fastener.—10,706, G. Evans, Construction of Window-frames and Hanging the Sashes.

July 25.—10,755, T. Normanton, Inlet and Outlet Ventilators.—10,757, F. Wendling, Paint for Stone, Plaster, &c.—10,770, H. Hind, Door Fastener.
July 26.—10,801, G. Garrett, Sanitary Traps, &c.—10,805, T. Normanton and S. Major, Inlet Ventilators, &c.—10,824, C. Torkington, Preventing the Shaking of Window-sashes.—10,842, W. Davies, Flushing Apparatus.

PROVISIONAL SPECIFICATIONS ACCEPTED.

6,510, S. Smith, Moulding Machines.—7,618, W. Ross, Bricks.—8,963, W. Sayer, Apparatus for Making Bricks, Tiles, &c.—9,054, W. Peyton, Chimney Head or Pot.—9,343, F. Hodges, Mitreing Mouldings, &c.—9,388, A. Ramsden, Sewer and other Pipe Joints.—9,591, E. Thorp, Wind and Water Bars for Meeting Rails and Sliding Sashes, &c.—9,594, L. Pary's Raising and Lowering Sashes.—9,644, S. Baggs, Dust and Draught Preventer for Doors.—9,645, A. Taylor, Boxes and Moulds for Pressing Bricks.—9,760, R. Pym, Fastenings for Doors.—9,761, J. Palmer, Plastic Wall Decoration Composition.—9,876, T. Clarke and C. Crapp, Preventing Cellars, Rooms, &c., from being Flooded from Drains or Sewers.—10,099, H. Hart, Brick for Building Purposes.—10,100, G. Dixon and W. Pretyman, Window Fastenings.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to Opposition for Two Months.

11,535, H. Joel, Pneumatic Bells and Signals.—12,362, P. Barrett, Counter-balancing Window-sashes.—12,817, M. Clarke, Fireproof Curtains for Theatres, &c.—12,872, M. Blanchard, Bricks for Wells, &c.—16,769, R. Melhuish, Joiner's Parallel Vice.—16,927, T. Ford, Hydraulic Lifts.—7,840, E. Rowe and J. Smith, Door Fastening Indicator.—7,940, G. Dolliner, Opening Windows Outside and Inside of the Room.—8,245, G. Anslow, Door Locks and Latches.—8,808, H. Lake, Metallic Roofing Plates or Shingles.—8,997, H. & H. House, Controlling the Movement of Doors, &c.—9,036, G. Carlsen, Grinding Machine for Timber Frame Saws, &c.

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

JULY 19.

By HUMBERT, SON, & FLINT.

Staffordshire, The Lapley Hall Estate—Lapley Wood Farm, 218a. 3r. 19p., freehold	£4,325
Enclosures of land and water meadows, 52a. 2r. 27p., freehold	1,350
Numerous enclosures of land, 200a. 1r. 35p., freehold	5,050
Rent-charges amounting to £147. 13s. 6½d.	2,700

JULY 23.

By FULLER, MOON, & FULLER.

Banstead Common—The Residence, Mogador, a cottage, and about 14 acres, freehold	810

By BROWN, ROBERTS, & CO.

West Croydon—Ground-rents of £100, reversion in 93 years	2,540
Regent's-square—Ground-rents of £95, term 17 years	805

By REYNOLDS & EASON.

Bethnal Green—50 and 52, Quilter-street, 37 years, ground-rent £8. 8s.	480
Cheapside, Feather's-court—Freehold, area 1,500 ft.	4,200

By R. THOROWGOOD.

Ware, Herts—The Grange, with grounds, freehold	1,510

By BENINGFIELD & TIDY.

Broxbourne—Wormley House, freehold	600

By NEWSON & HARDING.

New Southgate—6, Millbrook Villas, freehold	250

By EGERTON & BEACH.

Bridport, near—Coombe Farm, and 530a. 3r. 15p., freehold	11,650

By E. WOOD.

Battersea—232, York-road, 33 years, ground-rent £8	400
Wandsworth—16, Sangora-road, 93 years, ground-rent £8. 8s.	460
Camberwell—15, Baldwin's-crescent, 79 years, ground-rent £10	530
Bowes Park—1 to 8, Carlton-villas; and 15 to 31 odd, Queen's-road, 93 years, ground-rent £96	1,900
Upper Clapton—21 and 23, Inver-road, 91 years, ground-rent £10	350
Woodford, Chelmsford-road—Woodbine Villa, freehold	380
Egham—Stanley-cottages, freehold	620

By ROBSON & PERRIN.

Crouch-hill—44, Shaftesbury-road, 79 years, ground-rent £7	33

JULY 24.

By A. WATSON.

Kensington—One-sixth share of Nos. 15 and 22, Holland-street; 5, Duke's-lane; 9 and 10, Newland-terrace; and 1 and 2, Baxter's-cottages, freehold	1,020

By C. D. FIELD & SONS.

Peckham—5, Lindo-street, 76 years, ground-rent £4	150
Kingsland—4 and 6, High-street, freehold	4,040
Beechwood-street—Freehold stabling, &c.	1,510

By BEAN, BURNETT, & CO.

Kensington—Ground-rent of £70, reversion in 83 years	1,600

By FURBER, PRICE, & FURBER.

Shepherd's Bush—60, Godolphin-road, 89 years, ground-rent £7	110
West India Dock-road—No. 57, freehold	250
Kensington—No. 46, High-street, freehold	3,450
Fulham—3 to 10, Caroline-place, 3 years, rental £70	700
34, 35, and 36, Victoria-road, 63 years, ground-rent £15	165

By DEBENHAM, TEWSON, & CO.

Upton Park—Two plots of freehold land	£1,430
Winchester, near—The residence, Greenhill, and 452a. 2r. 39p.	5,000
Wimbledon—The residence called Park House, and 5a. 0r. 25p., freehold	13,500

By S. & G. KINGSTON.

Spalding—Freehold farm, and 81a. 3r. 34p.	3,770

JULY 25.

By H. DONALDSON.

Dalston—24, Regent's-row, 55 years, ground-rent £3	195
Stoke Newington—25, Allerton-road, 92 years, ground-rent £7	400

By A. SAVILL & SON.

Ilford—Great Newburys Estate of 170a. 0r. 8p., freehold; and a rent-charge of £299. 16s. a year	11,500

By ROGERS, CHAPMAN, & THOMAS.

Battersea—10 and 14, Elcho-street, freehold	520
Regent's Park—15, Dorchester-place, 49 years, ground-rent £14	650

By RUSHWORTH & STEVENS.

New Bond-street—No. 32, Corporation leasehold	4,950
Kilburn, High-road—The Black Lion public-house, freehold	8,920
Brasted, Kent—Two cottages and a plot of land, freehold	820
Iver, Bucks—Two cottages and a plot of land at Love-green	510

By D. SMITH, SON, & OAKLEY.

Liphook Station, near—Three cottages and 2a. 1r. 17p.	360

By ARBER, RUTTER, & WAGHORN.

Lambeth—18, 20, 24, and 26, Broad-street, copyhold	795
8, Broad-street, The Coach and Horses tavern, copyhold	760
11, Princes-street, copyhold	480
1 to 4, Gunnell's-court, copyhold	285
21, Salamanca-street, copyhold	300
6, Granby-buildings and 23, Salamanca-street	110
Copyhold ground-rents of £38. 6s., reversion in 20 years; and 11 to 14, Little Salamanca-court, copyhold	1,730
4 to 16 even, Salamanca-street and 1, 2, and 3, Salamanca-court	840
4 to 10, Salamanca-court and 4, Little Lemon-court, freehold	530
32 and 33, Albert Embankment, copyhold	555
Albert Embankment—A plot of land, area 3,380 feet	1,000
Copyhold ground-rent of £13, reversion in 57 years	820
Copyhold ground-rent of £50, reversion in 57 years	1,140

JULY 26.

By C. C. & T. MOORE.

Bow-road—31 and 32, Merchant-street, freehold	510
Mile End—14, 16, 18, and 20, Coutt's-road, 49 years, ground-rent £18	750
Commercial-road—3 and 11, Dean-street, 9 years, ground-rent £11	90

By A. YOUNG.

Bermondsey—153 to 163 odd, Ford-road, freehold	2,580
Bromley-by-Bow—A plot of freehold land, 3,510 ft.	340

By BAKER & SONS.

Chelsea, Broughton-road—Ground-rent of £13, reversion in 97 years	299
64 to 74 even, Bullow-road, freehold	1,135
Victoria-road—Three plots of freehold land	176
Upper Norwood, Alexandra-road—Lawnswood, 66 years, ground-rent £9	620
The residences, Milton and Manora, 66 years, ground-rent £18	1,230

By G. B. HILLIARD & SON.

Maldon, near—Red Lyon's Farm, about 130 acres	1,300
King's Farm, 58a. 2r. 32p., freehold	300
Beacon Hill Farm, 104a. 1r. 12p., freehold	275

By E. STIMSON.

Horsleydown—10, Thomas-street, 18 years, ground-rent £12	125
50, Gainsford-street, 32 years, ground-rent £12	130
Camberwell—88 to 96 even, St. Mark's-road, freehold	1,615
98, St. Mark's-road, freehold	660
128 to 134 even, Farmer's-road, freehold	1,220
137, 139, and 141, Thomas-street, freehold	1,190
Old Kent-road—1, 3, and 5, Stockwell-street, freehold	300

By ARBER, RUTTER, & WAGHORN.

Lambeth—Copyhold ground-rent, £20. 10s., reversion in 28 years	600
78 to 88 even, Vauxhall-walk, copyhold	1,170
1 to 20, Gloucester-street, copyhold	5,350
Gloucester-street—A plot of land, area 1,400 ft.	3,000
44, Vauxhall-walk, copyhold	505
1 and 2, Windsor-cottages, copyhold	250
Woolwich—20, Church-street, freehold	600

By FAREBROTHER, ELLIS, & CO. (at Newark).

Westbourne Park, Lancaster-road—Ground-rents of £130, reversion in 75 years	3,370
All Saints'-road—Ground-rents of £110, reversion in 75 years	2,860
Tavistock-road—Ground-rents of £154, reversion in 75 years	3,980
Tavistock-crescent—Ground-rents of £85, reversion in 75 years	2,173
St. Luke's-road Mews—Ground-rents of £40, reversion in 75 years	1,000
Finsbury Park, Osborne-road—Ground-rents of £115. 14s., reversion in 86½ years	2,950
Marquis-road—Ground-rents of £15. 10s., reversion in 86½ years	395
Florence-road—Ground-rents of £28, reversion in 89½ years	710
Ground-rents of £28. 17s., reversion in 86½ years	725
Harrow-road—Ground-rents of £25. 16s., reversion in 79 years	660

By JENKINS, SONS, & ELLIS.

Lordship Lane—35, Cathrew-road, freehold	£240

By GLASIER & SONS.

Pulborough, Sussex—Stall House Farm, 112a. 2r. 39 p., freehold	£1,060
Slatter Farm, 370a. 2r. 26p., freehold	3,300
Gatewick and Broadford farms, 285a. 3r. 19p., freehold	2,900
Woodshill and Gobles farms, 300a. 2r. 22p., freehold	3,100

By H. J. BLISS & SONS.

Old Kent-road—23 & 25, Upcott-street, 73 years, ground-rent £9	325
Victoria Park—16, Cawley-road, 66 years, ground-rent £6	445
Shoreditch—214, Kingsland-road, freehold	610
Islington—10, Union-square, 39 years, ground-rent £5. 5s.	460
Victoria Park—9 to 14, Robinson-road, 66 years, ground-rent £24	2,250
Hackney—19, 20, & 21, Rutland-road, 64 years, ground-rent £12	680
6, Derby-road, 54 years, ground-rent £4	250
Shoreditch—17 to 25 odd, Weymouth-terrace, 25 years, ground-rent £17. 10s.	1,010
8 to 13, Fleming-street, 7 years, ground-rent £21	280
Dalston—75, 77, & 79, Marlborough-road, 57 years, ground-rent £10. 10s.	810
Hoxton, 16, 18, & 20, Norris-street, 31 years, ground-rent £19. 10s.	300
Bethnal Green—41 to 47 odd, James-street, and a plot of land, freehold	800
James-street—The Fountain public-house, freehold	1,650
163 to 177 odd, West-street, freehold	940
179 to 193 odd, West-street, freehold	935
Limehouse—34, St. Ann's-road, freehold	600
Spitalfields—40 & 42, White Lion-street, 21 years, ground-rent £24	60
33 & 35, Hanbury-street, 21 years, ground-rent £55	195
27, 29, & 31, Quaker-street and 1 to 4, New Square, 6 years, ground-rent £40	110
39 & 41, Quaker-street, 6 years, ground-rent £30	25

JULY 27.

By W. B. HALLETT.

Kingsland—A profit rental of £51, term 34 years	650
1, Ardleigh-road, 35 years, ground-rent £4	340
Sydenham—2, 4, 6, and 8, Kinver-road North, 95 years, ground-rent £24	1,150

By FLOOD & SONS.

Harrow-road—67, Clarendon-street, 64 years, ground-rent £5	345
10, Clarendon-street, 75 years, ground-rent £8	250

By TURNER, RUDGE, & TURNER.

Lingfield—An enclosure of freehold land, 4a 3r. 15p.	400

By HENRY & LATCHFORD.

Clapham—33 to 39 odd, Lavender-terrace, 46 years, ground-rent £11. 15s.	475

By GREEN & SON.

St. James's—2, Bennett-street, freehold	3,600

By R. REID.

Tottenham Court-road—An improved rental, £195, term 40 years	2,000
5, Tudor-place, freehold	445

By DRIVER & CO.

Bridgnorth—The Hay Farm, and Eardington Iron Works, 307a. 2r. 20p., freehold	8,000

By BALL, NORRIS, & HADLEY.

Peckham—98, 100, and 102, Pomeroy-street, 53 years, ground-rent £7	510
Brixton—50, Gresham-road, 76 years, ground-rent £1	760

By E. SMITH & CO.

St. John's Wood—74, Hamilton-terrace, 48 years, ground-rent £18	1,600

By ARBER, RUTTER, & WAGHORN.

Lambeth—32 to 42 even, Vauxhall-walk, copyhold	3,120
24 to 30 even, Vauxhall-walk, copyhold	1,385
Copyhold ground-rent of £6, reversion in 33 years	150
Copyhold ground-rent of £10. 10s., reversion in 17 years	750
4 to 9, High-street, copyhold	890
139 and 141, Lambeth-road, copyhold	990
20, Savile-place and 3, Berkeley-street, copyhold	510
2 to 11, Berkeley-street, copyhold	2,530
29 to 32, and 34, Berkeley-street, copyhold	1,175
16, 20, and 21, Berkeley-street, copyhold	935
8, Mill-street, copyhold	930
11 and 12, Pratt-street and 7, Mill-street, copyhold	610
68 to 74 even, Lambeth-walk, copyhold	1,360

MEETINGS.

TUESDAY, AUGUST 7.

Royal Archæological Institute.—Opening of the Leamington Congress. Visit to Stratford-on-Avon.
Glasgow Architectural Association.—Mr. A. N. Prentice on "Early English Architecture."

WEDNESDAY, AUGUST 8.

Royal Archæological Institute.—Leamington Congress (continued). Visit to Banbury, Broughton Castle, &c.

THURSDAY, AUGUST 9.

Royal Archæological Institute.—Leamington Congress (continued). Visit to Warwick, &c.

FRIDAY, AUGUST 10.

Royal Archæological Institute.—Leamington Congress (continued). Visits to Kenilworth Castle and Stoneleigh Abbey.

SATURDAY, AUGUST 11.

Royal Archæological Institute.—Leamington Congress (continued). Visit to Coventry.

Miscellanea.

The Registration of Plumbers.—A public meeting was held in the Free Library at Liverpool, last week, "to consider the registration of qualified plumbers as a measure for securing higher efficiency of plumbers' craftsmanship in the interests of public health." The chairman of the Health Committee presided, supported by the medical officers and sanitary authorities of the chief towns in the district. Dr. J. S. Taylor, Medical Officer of Health, Liverpool, proposed that a district council should be appointed for Liverpool, Birkenhead, West Lancashire, Cheshire, Denbigh, Flint, Carnarvon, and Anglesey, to act in union with the Plumbers' Company.—Mr. Duckworth, President of the Liverpool School of Science, seconded the resolution, which was carried, and a district council, composed of representatives of the public and the plumbers of the locality, was appointed.——At the City and Guilds Institute, Finsbury, on Monday, an examination was held, under the auspices of the Worshipful Company of Plumbers, for certificates of registration. The practical examination included various branches of lead work, and the theoretical questions relating to the several subjects of plumbers' materials, house fittings, and sanitation. Plumbers attended from Fordingbridge, Exeter, Tunbridge Wells, Ryde, Bicester, Margate, and various districts of London. The examiners were Mr. Chas. Hudson, Assistant Chairman of the Registration Committee, and Messrs. Ashdown, Davis, Lobb, Lyne, Millis, Smeaton, Taylor, and Webb. Rather less than 50 per cent. of those attending passed the full examination.

Fire Rescue Exhibition.—On Monday the Lord Mayor opened an exhibition of articles and appliances relating to the rescue of life from fire and cognate dangers, at the Portman Rooms, Baker-street. The proceedings were opened by Dr. Danford Thomas, who explained the aim of the exhibition to be the instruction of the public, both as to preventive and remedial measures. The apathy that existed upon the subject was appalling, and he hoped one result of the exhibition would be to induce the heads of business firms and private persons to provide themselves with effective means of escape. The exhibition, which is both extensive and interesting, contains a large variety of fire-escapes suitable for private houses and public buildings; fire extinguishers, and preparations designed to render dress materials, curtains, &c., non-inflammable. Interesting trials are conducted daily while the exhibition lasts, with the view of showing how rapidly and easily escape from a burning building may be effected by some of the appliances exhibited. The exhibition remains open until Saturday, and any profits resulting from it will be given to the Royal Humane Society. Of a few of the more notable of the exhibits we propose to speak on a future occasion.

Excursion of Messrs. John Mowlem & Co.'s Staff.—On Saturday last the staff of Messrs. John Mowlem & Co. had their summer excursion. The party, consisting of the managers, foremen, and clerks, and numbering about 170, left Waterloo at 7 a.m. by special train for Bournemouth, whence the party proceeded by steamer for a sea trip, and then to Swanage, where Mr. Burt, senior, resides. Dinner was served at Durlston Castle, Durlston Head, Swanage, all the members of the firm (as also the lately-retired partners, Mr. Joseph Freeman and Mr. George Burt, and other friends) being present. Mr. Burt gave the toast of "The Queen," the only other toast drunk being "The Firm of John Mowlem & Co.," which was proposed by Mr. Robertson, of the Outside Staff, and very cordially received. After dinner the company dispersed to examine the objects of interest in the neighbourhood, meeting again later in the grounds of Mr. Burt's house, where tea was partaken of. The party returned by steamer and train, and reached Waterloo at 11 p.m., the weather having continued fine throughout the day.

The Great Northern Central Hospital.—In reference to this hospital, of which we gave a description last week (p. 65, *ante*), we are asked to mention that Boyle's latest improved patent self-acting air-pump ventilators are used on certain portions of the building. Mr. J. E. Ellison, of Leeds, writes to say that the gratings between the beds in the wards are fitted on the inside with his patent "Radiator ventilators." Messrs. Guynan & Son, of Carburton-street, supplied the whole of the blinds.

The English Iron Trade.—The improvement in the English iron trade continues to make steady progress. The pig-iron market is especially strong. Scotch warrants have been active this week, and are steadily advancing; Scotch makers' irons having also risen from 6d. to 1s. a ton. Middlesbrough pig has likewise made another move upwards, of 6d. per ton, or 1s. during a fortnight, and is now quoted 33s. cash, at which price makers decline selling. The Lancashire pig-iron market is stronger, and there has been an advance of between 1s. and 1s. 6d. a ton in the lower-priced brands. Bessemer iron has gone up from 9d. to 1s. per ton, and is now quoted at 43s. 6d. to 44s. for mixed numbers. Besides a steady demand, the gradual decrease in stocks helps to strengthen the pig-iron market. Manufactured iron is enjoying a good inquiry, under which prices have considerably stiffened. The same can be said of tinplates, of which makers hold large orders. Steelmakers are much pressed for delivery of shipbuilding material, and they are also busy on rails; but there has been no upward movements in values. Shipbuilders are well off for work, and their prospects are very fair. In the engineering trades the improvement recently reported is well maintained.—*Iron.*

The Drainage of Swinton.—The *Manchester Guardian* reports that Mr. Arnold Taylor, of the Local Government Board Office, opened an inquiry a few days ago at the offices of the Swinton and Pendlebury Local Board into that Board's application for sanction to borrow £8,129 for works of sewage and sewage disposal. The Clerk (Mr. Hewetson) explained that the Swinton and Pendlebury Local Board, being threatened with litigation in respect of the pollution of Slack Brook and the River Irwell, had, with the advice and assistance of Mr. Vawser, C.E., adopted a scheme for the treatment of sewage, which the Board proposed to carry out on land at the Carrs, Pendlebury, now belonging to Messsrs. A Knowles & Sons. Mr. Mountain and Mr. Vawser explained the nature of the proposed works, and Mr. Arnold Taylor, having heard further evidence for and against the scheme, afterwards visited the site in question.

The New Crematorium in Milan.—Referring to the new crematorium just opened in Milan, the *Secolo* states that it is situated at the end of Campo Santo, just outside the walls of the city. The "Temple," as it is called, is in Doric-Greek style, and built of stone, with an open façade supported by columns. Behind it rises a tower, which seems connected with it, but it is in reality a huge chimney. The building is divided into rooms for various purposes, as the religious ceremonies, the depositing of urns containing the ashes of the cremated, &c. There is one furnace for the consumption of bodies infected with contagious diseases, and one for ordinary cases. Neither the bodies nor the ashes are seen by those present. The process is the most perfect known, and occupies two hours. New crematoria will also be opened this year in Turin, San Remo, Verona, Bologna, and Padua.

Mr. John Bellamy's Employes at Broxbourne.—Last week the employés of Mr. John Bellamy, tank and boiler-maker, of Byng-street, Millwall, had a most enjoyable outing to Broxbourne, to celebrate the twenty-fifth anniversary of the foundation of the firm. The excursionists made the journey in brakes, Mr. Bellamy, with his clerks and heads of departments, being of the number. They were lucky enough to have good weather, which is saying a great deal just now. On arriving at the Crown Hotel the party was entertained by Mr. Bellamy to dinner, Messrs. Parnell and Scriven occupying the vice-chairs, and the host being supported right and left by Messrs. Hooff, Dyson, Howlett, Piper, Davis, Clague, and Campbell.

Sales of Building Sites at Dovercourt.—Last week Mr. F. C. Kettle, of Moorgate-street, submitted for sale at Dovercourt, near Harwich, several plots of building land, being a portion of an estate belonging to the Chelmsford Land Company. The company had engaged one of the Great Eastern Railway Company's trains to take intending purchasers and others to the estate, and about 200 persons were present. The estate is situated in an eligible locality, with a commanding sea-view. Out of eighty-two lots which were submitted, upwards of fifty were sold, the average prices obtained being from 50*l.* to 60*l.* for each lot, the sale realising about 3,600*l.*

Large Sale of Building Land at Frinton.—On Monday last Mr. Richard J. Collier conducted in extensive sale of freehold building land at Frinton, a new seaside resort on the East coast, situate between Clacton-on-Sea and Walton-on-the-Naze, at which an estate of upwards of 100 acres in extent has been purchased by the Marine and General Land, Building, and Investment Company, who have laid out the estate for building upon, several new roads having been formed, together with an esplanade facing the sea, upwards of a mile and a half in length, in front of which is a turfed promenade running the entire length of the esplanade. The estate is situated on high ground, with a commanding view of the German Ocean. Already several high-class houses have been erected along the esplanade frontage, and also facing the several new roads which have been formed, whilst building is now going forward on different parts of the estate. The Tendring Hundred Water Company, whose district includes Walton-on-the-Naze, Clacton, and several surrounding parishes, have nearly completed the laying down of water-mains in all the newly-formed roads; and amongst other works to be carried out is an ornamental sea-wall, running the full length of the cliffs and esplanade. The lots offered were ninety-seven in number, including several shop plots and a large hotel plot facing the sea, having a frontage of more than 200 ft. The sale took place at the Queen's Hotel, which has recently been erected on the estate. The plots submitted were all unusually large ones, varying in their frontages from 30 ft. to 120 ft., and in depth from 100 ft. to 160 ft. On the sale commencing the biddings became close and spirited, and a large proportion of the lots offered were sold at prices varying from 30*l.* for the smaller lots, to 60*l.*, 80*l.*, and 100*l.* for those having a larger area. Three lots on the East Cliff, facing the sea, and situated on that part of the estate described as the Crescent, having frontages of 100 ft., and depths of 170 ft., were sold for 125*l.* each. An angular plot close to the sea, containing 3½ acres, was sold for 395*l.* For the large hotel plot facing the West Cliff, having frontages of 200 ft., 410*l.* was offered, but being below the average, was bought in at 450*l.* The total proceeds of the day's sale amounted to 3,400*l.*

Unseasonable Weather and the Public Health.—The popular conviction that seasonable weather—that is, the prevalence of Arctic cold in winter and of Tropical heat in summer—is conducive to health, will probably long survive the most convincing statistical evidence of the fallacy on which it is based. It may be useful, however, to call attention to the apparent effect of the recent long-continued spell of unseasonable summer weather upon the public health, judged by the death-rate. During the six weeks ending on Saturday [July 21], the mean temperature at the Royal Observatory, Greenwich, was almost continuously below the average. If we except five days in June (the 11th, 12th, 24th, 25th, and 26th), a deficiency in the mean temperature was recorded on each of the forty-two days in this period. The average daily deficiency on these thirty-seven days of low temperature was no less than 5·2 deg. F., the coldest days being the 11th and 12th of July, when the deficiency was no less than 14·0 deg. and 13·4 deg. The frequency and amount of rainfall during this period were almost as remarkable as the low temperature. Rain was measured on twenty-seven of the forty-two days in this period of six weeks to the aggregate amount of 6·13 in., being almost identical with the amount measured this year previously to the six weeks under notice. Let us now consider what has been the death-rate in our largest English towns reported by the Registrar-General during this unseasonably, and probably unprecedentedly, cold and wet period. In the twenty-eight large English towns dealt with in the Registrar-General's weekly return the annual death-rate in the six weeks now under notice was equal to 15·7 per 1,000 of the estimated population,—a rate very far below any previously recorded during this period; the mean rate in the corresponding period of the six preceding years 1882-87 was 19·3, and exceeded by 3·6 the rate in the six weeks ending July 21. From the above-mentioned facts, it is, at any rate, patent that the recent cold, wet, and sunless weather cannot have unfavourably affected the public health, even if we hesitate to affirm that the low death-rate has been due to the prevalence of such exceptionally unseasonable weather.—*Lancet.*

PRICES CURRENT OF MATERIALS.

TIMBER.	£.	s.	d.	£.	s.	d.
Greenheart, B.G. ....ton	6	10	0	7	10	0
Teak, E.I.....load	8	0	0	12	10	0
Sequoia, U.S.....foot cube	0	2	3	0	3	0
Birch, Canada .....load	2	15	0	4	15	0
Fir, Dantsic, &c.	2	0	0	4	0	0
Oak ,, ...	2	0	0	4	10	0
Canada	4	0	0	6	10	0
Pine, Canada red	2	10	0	3	10	0
,, yellow	2	10	0	4	0	0
Lath, Dantsic.....fathom	3	10	0	5	0	0
St. Petersburg.....	5	0	0	6	0	0
Wainscot, Odessa, crown.....	2	10	0	3	0	0
Deals, Finland, 2nd and 1st...std.100	8	0	0	9	10	0
,, 4th and 3rd.....	6	10	0	7	10	0
Riga	6	0	0	7	10	0
St. Petersburg, 1st yellow	9	10	0	14	10	0
,, 2nd ,, ...	8	0	0	9	0	0
,, white	7	0	0	10	0	0
Swedish.....	7	0	0	15	10	0
White Sea	8	0	0	17	0	0
Canada, Pine, 1st	14	0	0	23	0	0
,, ,, 2nd	9	0	0	15	0	0
,, ,, 3rd, &c.	7	0	0	9	10	0
,, Spruce, 1st	8	0	0	9	10	0
,, 3rd and 2nd	6	0	0	7	10	0
New Brunswick, &c.	6	0	0	7	5	0
Battens, all kinds	4	10	0	11	0	0
Flooring Boards, sq., 1 in., prepared, First	0	10	0	0	13	0
Second	0	7	0	0	9	6
Other qualities	0	4	6	0	6	6
Cedar, Cuba.....foot	0	0	3½	0	0	4
Honduras, &c.....	0	0	3½	0	0	3½
Australian	0	0	2½	0	0	3½
Mahogany, Cuba	0	0	4½	0	0	5½
St. Domingo, cargo average	0	0	4½	0	0	5½
Mexican ,, ...	0	0	4	0	0	4½
Tobasco ,, ...	0	0	4½	0	0	5½
Honduras ,, ...	0	0	4½	0	0	5½

TIMBER (*continued*).	£.	s.	d.	£.	s.	d.
Rose, Rio .....ton	8	0	0	11	0	0
Box, Turkey .....foot	5	0	0	12	0	0
Walnut, Italian .....foot	0	0	4½	0	0	6
METALS.						
Iron—Bar, Welsh, in London...ton	4	17	6	5	0	0
,, ,, at works in Wales ...	4	7	6	4	10	0
,, Staffordshire, in London ...	5	5	0	7	0	0
Copper—						
British, cake and ingot..... ton	74	0	0	75	0	0
Best selected	75	10	0	0	0	0
Sheets, strong	80	0	0	0	0	0
Chili, bars	81	0	0	0	0	0
Yellow Metal.....lb.	0	0	7½	0	0	7⅝
Lead—						
Pig, Spanish .....ton	13	2	6	0	0	0
English, common brands	13	7	6	0	0	0
Sheet, English.....	13	7	6	13	12	6
Spelter—						
Silesian, special .....ton	16	5	0	16	7	6
Ordinary brands.....	16	0	0	16	2	6
Tin—						
Straits .....ton	89	10	0	0	0	0
Australian	89	15	0	0	0	0
English Ingots.....	94	10	0	0	0	0
Zinc—						
English sheet.....ton	18	10	0	19	0	0
OILS.						
Linseed .....ton	18	0	0	0	0	0
Cocoanut, Cochin	24	10	0	27	0	0
Ceylon	22	0	0	0	0	0
Palm, Lagos	20	0	0	20	10	0
Rapeseed, English pale	24	15	0	0	0	0
,, brown	22	15	0	23	0	0
Cottonseed, refined	20	10	0	0	0	0
Tallow and Oleine	25	0	0	45	0	0
Lubricating, U.S.	5	15	0	6	0	0
,, refined	7	0	0	12	0	0
Turpentine—						
American, in casks.....cwt.	1	6	9	1	7	0
Tar—						
Stockholm .....barrel	0	15	9	0	0	0
Archangel	0	9	6	0	0	0

CONTRACTS AND PUBLIC APPOINTMENTS.

Epitome of Advertisements in this Number.

CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Supply of Water-Mains, and Laying same.....	Ely Local Board	*Official*.....	August 7th	ii.
Kerbing, Tarpaving, Metalling, &c., Works...	Lewisham Board of Wks	do.	do.	i.
Asphalte Paving.....	St. Martin-in-the-Fields Vestry	do.	August 9th	x.
Main Sewers	Leicester Corporation...	J. Gordon	do.	ii.
New Lighthouse at Southwold	Trinity House Cor.	E. Clark	do.	ii.
Painting, &c.	Westminster Union ...	J. Waldram	August 10th	ii.
Iron Pipes	Tottenham Local Board	J. E Worth	do.	x.
Infectious Diseases Hospital	Derby U.S.A.	R. J. Harrison	August 11th	ii.
Slating	Leicester Cor. Gas Co.	A. Colson.....	do.	ii.
New Ward, Sedgefield Asylum	Durham County Lunatic Asylum.....	*Official*.....	August 13th	ii.
Limestone or Asphaltic Tar-Paving	East Ham Local Board	W. H. Savage.....	August 14th	x.
White and Colour Washing, Painting, &c.....	Hackney Union.....	W. Barnett.....	August 15th	x.
Depôt, West Brompton	House-to-House Electric Light Supply Co. ...	*Official*.....	August 16th	x.
Repair, Making-up, and Kerbing of Road	Finchley Local Board...	G. W. Brumell	August 20th	x.
Sewering and making-good Roads.....	Hornsey Local Board...	T. De Courcy Meade ...	do.	ii.
Iron Roof for Market Ground	St. Helen's Corporation	G. J. C. Broom.....	August 22nd	x.
Alteration, &c., Uckfield Parish Church	The Committee.....	W. Lacy Ridge.....	Not stated...	ii.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
Engineer and Foreman of Works	Met. Asylums Board ...	156*l.*	August 9th	xvi.
Junior Examiner, Office of Works	Civil Service Com.	Not stated.....	August 22nd	xvi.

TENDERS.

[Communications for insertion under this heading must reach us *not later than* 12 *Noon on Thursdays.*]

BEXHILL.—For finishing house at Bexhill for Dr. Wills. Mr. Mark J. Lansdell, architect, 71, Cambridge-road, Hastings :—

J. & P. Phillips, Hastings	£336	0	0
W. H. Eldridge & Son, Hastings	302	0	0
T. Vigor, Hastings	298	0	0
W. E. Warman, Hastings.....	290	0	0
D. H. Snow, Ore (accepted)	257	0	0
M. Martin, Eastbourne	238	0	0

BRISTOL.—For erecting the Ashton Gate Board Schools, Bristol. Messrs. Hansom & Bond, architects, Bristol. Quantities supplied :—

	School building.	Boundary walls.
H. A. Forse, Bristol.....	£3,760	£250
W. Church, Bristol	3,717	267
Stephens & Bastow, Bristol...	3,630	232
W. H. Cowlin & Son, Bristol	3,573	234
Eastabrook & Sons, Bristol ...	3,549	198
G. Humphries, Bristol	3,490	243
J. Perrott, Bristol	3,393	217
T. R. Lewis, Bristol	3,379	185
J. Wilkins & Son, Bristol.....	3,370	230
A. J. Beaven, Bristol	3,370	205
H. Rossiter, Bristol	3,300	187
C. J. King & Son, Bitton.....	3,055	193
R. Warmington, Fishponds...	2,334	180

CANNING TOWN.—For the erection of five dwelling-houses and shop in Freemason's-road, Canning Town, for Mr. J. Kendall. Mr. Fred. A. Ashton, architect, Stratford :—

Hearle & Son (accepted).....	£1,230	0	0

CHESHAM (Bucks).—For rebuilding the Cock, for Messrs. Salter & Co., of Rickmansworth. Mr. Chas. P. Ayres, architect, Watford :—

A. Mead, Chesham.....	£817	8	0
H. M. Dove, Watford	795	0	0
J. Bates, Chorley Wood.....	773	17	0
G. Darlington, Amersham	760	0	0
Rance Bros., Luton	735	0	0
Brown & Sons, Harefield	725	0	0
W. Boughton, Chesham	710	0	0
T. Turner, Limited, Watford	699	0	0

CHESHAM (Bucks).—For rebuilding the Prince of Wales Tavern, for Messrs. Salter & Co., of Rickmansworth. Mr. Chas. P. Ayres, architect, Watford :—

Brown & Sons, Harefield	£ 63	15	0
J. Bates, Chorley Wood.....	749	10	0
H. M. Dove, Watford	720	0	0
T. Turner (Limited), Watford.....	634	0	0
G. Darlington, Amersham	630	0	0
A. Mead, Chesham.....	559	0	0
W. Boughton, Chesham.....	556	0	0

CROYDON.—Nor new Junior Schools and addition to Infants' Department, including new boundary walls, &c., to the Sydenham-road Schools, for the Croydon School Board. Mr. Robert Ridge, Surveyor to the Board, architect. Quantities by the architect :—

Holt.....	£3,700	0	0
Hart.....	3,687	0	0
Bowyer	3,585	0	0
Ward	3,574	0	0
Bryan	3,557	0	0
Smith & Bulled.....	3,385	0	0
Barker.....	3,350	0	0
Marriage.....	3,288	0	0
Smith & Sons (accepted)	3,087	0	0
Caplen & Redgrave (withdrawn)	2,810	8	7

CROYDON.—For repairs and painting to the several Board schools as under, for the Croydon School Board. Mr. Robert Ridge, surveyor. No quantities :—

Upper Norwood (Internally).

Smith & Sons.....	£106	0	0
Bryan	89	10	0
Bowyer	79	0	0
Coleby & Co. (accepted)	64	15	0

South Norwood (Externally).

Coleby & Co.....	87	10	0
Bryan	70	10	0
Smith & Sons	58	0	0
Bowyer (accepted)	41	0	0

Mitcham-road (Externally).

Winburn.....	£144	15	0
Pearce	133	0	0
Knight & Bennett	122	0	0
King	120	0	0
W. Dartnell	108	0	0
Pearson & Co.	88	10	0
Lawrence	74	15	0
Marriage (accepted)	74	0	0

CROYDON.—For the making-up of King's-road, South Norwood, for Corporation of Croydon :—

A. Bullock	£569	15	9
H. Lake	546	2	3
H. Streeter	538	4	4
W. Langridge (accepted)	503	8	2

[All of Croydon.]

GREENHILL (Derby).—For Wesleyan Schools, Greenhill, Derby. Mr. John Wills, architect, Derby :—

Wagg	£815	0	0
Kelham	780	0	0
Vernon (accepted)	753	0	0

HASTINGS.—For new committee-room at St. Andrew's Schools, Hastings. Mr. A. A. G. Colpoys, architect, Havelock-road, Hastings.

S. Foster	£230	0	0
C. Tanner	210	0	0
H. L. F. Rodda	210	0	0
F. Cruttenden	208	0	0
H. E. Pollington	199	0	0
W. Coussens.....	188	0	0
A. H. White.....	184	0	0
W. E. Warman	180	0	0
H. B. Britt	178	0	0
J. Lester	177	0	0
W. F. Gammon	162	0	0
C. Burden.....	156	0	0

HEMEL HEMPSTEAD (Herts).—For the re-erection of the Bury Mill, for Mr. Edward Meade. Mr. W. H. Syme, architect, Watford :—

Judge & Eames, Watford	£1,624	0	0
G. & J. Waterman, Watford.....	1,417	0	0
S. C. Smith, Hemel Hempstead	1,340	0	0
Andrews & Sons, Watford.....	1,335	0	0
James Payne, Hemel Hempstead.....	1,335	0	0
Thomas Turner (Limited), Watford	1,244	0	0
W. Sear, Hemel Hempstead*	1,220	10	0

* Accepted.

KEYNSHAM (Somerset).—For alterations and additions at Durley Hill, Keynsham. Mr. H. Phelps Drew, architect, 99, Gloucester-road, London, S.W. :—

Bastow, Bristol.....	£1,333	0	0
Lewis, Bristol*.....	1,208	0	0

* Accepted, subject to revision.

KINGSTON-ON-SOAR (Notts).—For erecting two pairs of artisans' cottages, to be erected at Kingston-on-Soar, Nottinghamshire, for the Right Hon. Lord Belper. Mr. Henry Hall, architect, 19, Doughty-street, Mecklenburgh-square, London :—

Black, Barrow-on-Soar	£970	0	0
Slater, Ashby-de-la-Zouch.....	957	10	0
Bramley, Kegworth.....	949	10	0
Wilders, Kegworth	828	0	0
Blood Bros., Sheepshed.....	823	0	0

LINCOLN.—For extensions of the Lincoln Co-operative Society's Central Stores, Silver-street and Free School-lane, Lincoln. Mr. F. Smith, architect, Manchester. Quantities supplied by the architect :—

Kirk & Knight, Sleaford.....	£9,600	0	0
J. M. Thompson & Sons, Louth	8,700	0	0
Chas. Baines, Newark.....	8,686	0	0
H. S. & W. Close, Lincoln.....	8,649	0	0
Otter & Broughton, Lincoln	8,500	0	0
Chas. Robinson, Lincoln	8,260	0	0
J. B. Harrison, Lincoln	7,856	0	0
S. & R. Horton, Lincoln.....	7,856	0	0
J. W. Harrison, Lincoln	7,737	0	0
Wm. Wright & Sons, Lincoln*.....	7,380	0	0

* Accepted.

LONDON.—For the erection of twenty-four small houses in Hobson's-place, Hobson's-court, and Pelham street, Mile End New Town, E. Mr. John Hudson, architect, 80, Leman-street, E. :—

J. Loveday.....	£7,570	0	0
M. Calnan & Co.	7,391	0	0
J. Hearle & Son	7,284	0	0
F. & F. J. Wood	7,083	0	0
C. P. Roberts	7,026	0	0
J. S. Hammond & Son	6,977	0	0
J. Bentley	6,976	0	0
J. Outhwaite & Son	6,903	0	0
T. Little	6,859	0	0
T. Norton & Son	6,803	0	0
W. Catmur	6,680	0	0
H. Wells.....	6,620	0	0
J. & H. Cocks	6,594	0	0
J. Sparks	6,500	0	0
Harris & Wardrop	6,493	0	0
Coulsell Bros.....	5,720	0	0
W. Gladding (accepted)	5,587	0	0

LONDON.—For altering covered way and enlarging Baker-street Station, for the Metropolitan Railway Company. Mr. C. P. Seaton, C.E., engineer. Quantities supplied by Mr. A. R. Brede, surveyor, 58, Theobald's-road, W.C. :—

Firbank Bros. (accepted)	£9,300	0	0

LONDON.—For the erection of a school to provide accommodation for 800 children, and also a pupil teachers' school, on the site in Lavender-hill (West Lambeth BJ), for the School Board for London. Mr. T. J. Bailey, architect:—

Kirk Bros.	£20,235	0	0
S. Hart	19,700	0	0
H. L. Holloway	19,552	0	0
C. Wall	18,212	0	0
S. J. Jerrard	17,935	0	0
Stimpson & Co.	17,680	0	0
W. Johnson	17,493	0	0
J. Holloway*	17,000	0	0

* Recommended by the Works Committee for acceptance.

LONDON.—For the erection of a school to provide accommodation for 1,000 children on the site in Longford-road (Chelsea Q1), for the School Board for London. Mr. T. J. Bailey, architect:—

H. L. Holloway	£13,664	0	0
S. Hart	13,539	0	0
S. J. Jerrard	13,277	0	0
W. Johnson	13,074	0	0
Stimpson & Co.	12,890	0	0
J. Holloway	12,656	0	0
C. Wall*	12,578	0	0

* Recommended by the Works Committee for acceptance.

LONDON.—For erecting Divisional Offices, a Deaf and Dumb Centre, a Cookery Centre, and schoolkeeper's house, on a site in Morning-lane (Hackney J), for the School Board for London. Mr. T. J. Bailey, architect:—

Atherton & Latta	£3,295	0	0
Norris & Luke	3,123	0	0
C. Dearing & Son	3,020	0	0
H. L. Holloway	3,000	0	0
Stimpson & Co.	2,970	0	0
C. Cox	2,894	0	0
W. Johnson	2,894	0	0
W. M. Dabbs*	2,793	0	0

* Recommended by the Works Committee for acceptance.

LONDON.—For the erection of a Cookery Centre on the Princess-road site (Marylebone O1), for the School Board for London. Mr. T. J. Bailey, architect:—

J. Linfield	£748	0	0
Wall Bros.*	550	0	0

* Recommended by the Works Committee for acceptance.

LONDON.—For certain works at Hanbury-street, Spitalfields, for Messrs. Tingle, Jacobs, & Co. Mr. R. W. Hobden, architect, 14, Devonshire-street, E.C.:—

Allard	£300	0	0
Pacy & Clarke	279	0	0
George Lusk, Mile End	259	0	0
Exton & Burton	237	0	0
Jennings	225	0	0

LONDON—For erecting a new warehouse, on section "F," at Free Trade Wharf, Broad-street, Ratcliff, Middlesex, for the Free Trade Wharf Company. Mr. Charles Dunch, architect. Quantities by Mr. James F. Wesley, 277, Romford-road, Forest-gate:—

Patman & Fotheringham	£5,223	0	0
Grover & Son	5,206	0	0
Colls & Son	5,198	0	0
B. E. Nightingale	5,190	0	0
Mark Gentry	5,182	0	0
Mowlem & Co.	5,180	0	0
Lawrence & Sons	4,999	0	0
J. Morter	4,880	0	0
Harris & Wardrop	4,853	0	0
Ashby & Horner	4,850	0	0
W. Shepherd	4,723	0	0
J. & J. Greenwood	4,721	0	0

LONDON.—For sanitary and decorative work at No. 25, Blyth-villas, West Kensington. Mr. H. Phelps Drew, architect, 99, Gloucester-road, S.W.:—

Polden	£471	10	0
Nash	387	10	0
Hewett	347	10	0
Norton (accepted)	343	0	0

LONDON.—For repairs and alterations to 571 and 573, Commercial-road, E., for Mr. Boner. Mr. Joseph Harris, architect, Bow:—

Pringle	£494	0	0
Calnan	491	0	0
Lusk	440	0	0
Cutmore & Co.	425	0	0
Timson (accepted)	375	0	0

LONDON.—For block of offices, Cloak-lane. Mr. T. Tayler Smith, architect:—

Messrs. Stephens, Bastow, & Co., Bristol (accepted at per schedule of prices).

LONDON.—For works at 113, Cheapside, E.C., for Messrs. Reeves & Son. Mr. C. R. Hancock, 47, Old Broad-street, E.C., architect:—

Quarterman	£552	0	0
Langler & Pinkham	442	0	0
J. Anley	439	0	0

LONDON.—For painting, decorating, carpentry, and electrical bell-fitting, at 46, Bramham-gardens, S.W.:—

Godfrey Giles & Co. (accepted)	£265	0	0

[Lowest of three tenders.]

LONDON.—For rebuilding the Cock Tavern, Arthur-street East, E.C., for Mr. A. Smith. Mr. Fred. A. Ashton, architect, Stratford:—

S. Smith (accepted)	£5,320	0	0

ROMFORD.—For erecting covered yard and stabling at the rear of the Woolpack Inn, Romford, Essex, for Messrs. Ind, Coope, & Co., Limited. Mr. John Hudson, architect, 80, Leman-street, E.:—

J. Bentley, Waltham Abbey	£889	0	0
J. S. Hammond & Son, Romford	867	0	0
W. Gladding, Whitechapel (accepted)	754	0	0

TOTTENHAM.—For rebuilding three villa residences and stabling, West Green-road, Tottenham, N., for Mr. B. Sharp. Mr. J. E. Pinder, architect:—

Coldwells & Son	£1,680	0	0
Knight & Son	1,420	0	0
Hicks	1,250	0	0
Groves	1,105	0	0

TOTTENHAM.—For erecting villa residence at Tottenham:—

W. Harris, Melbourn, Cambs.*	£750	0	0

* Accepted.

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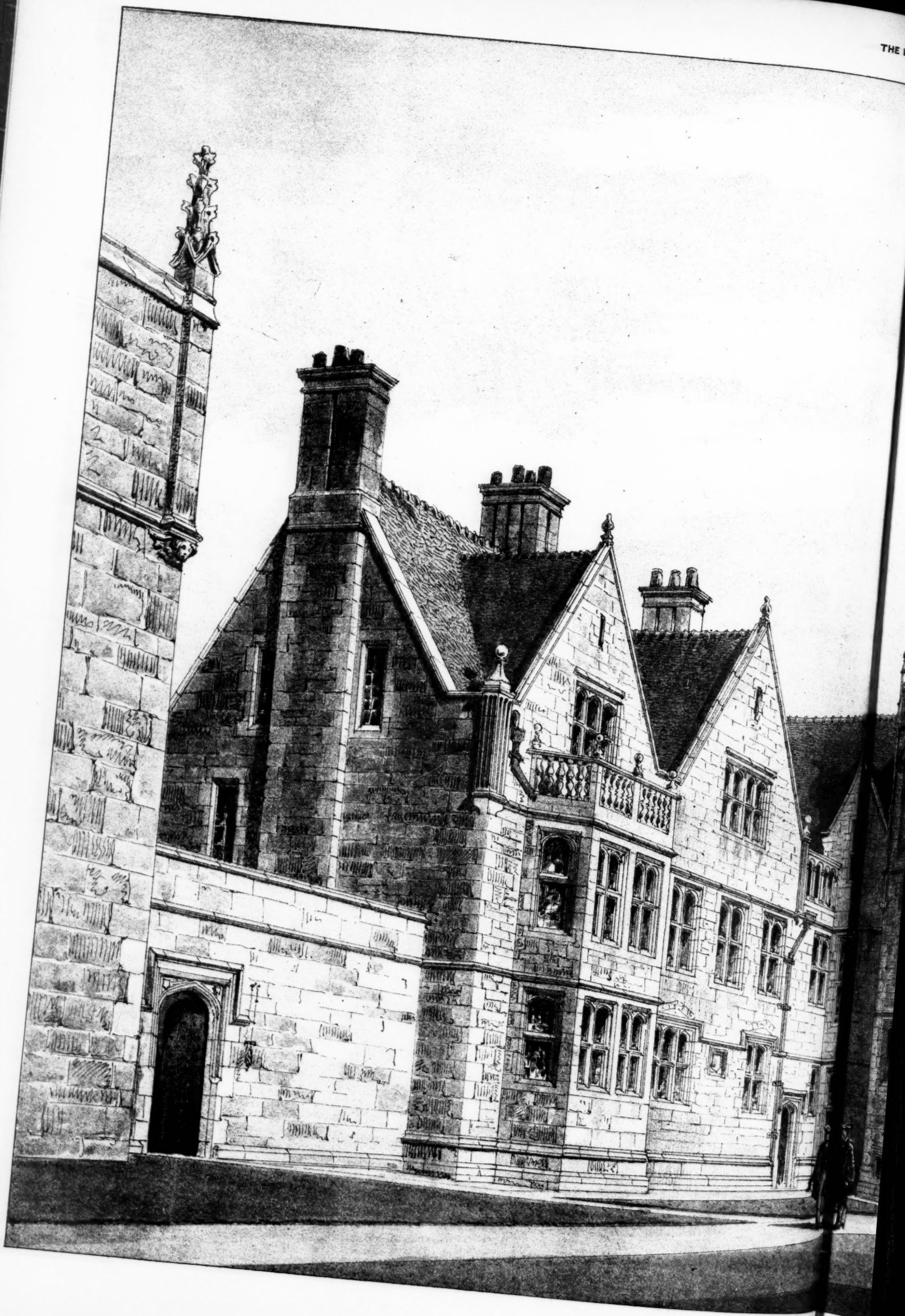
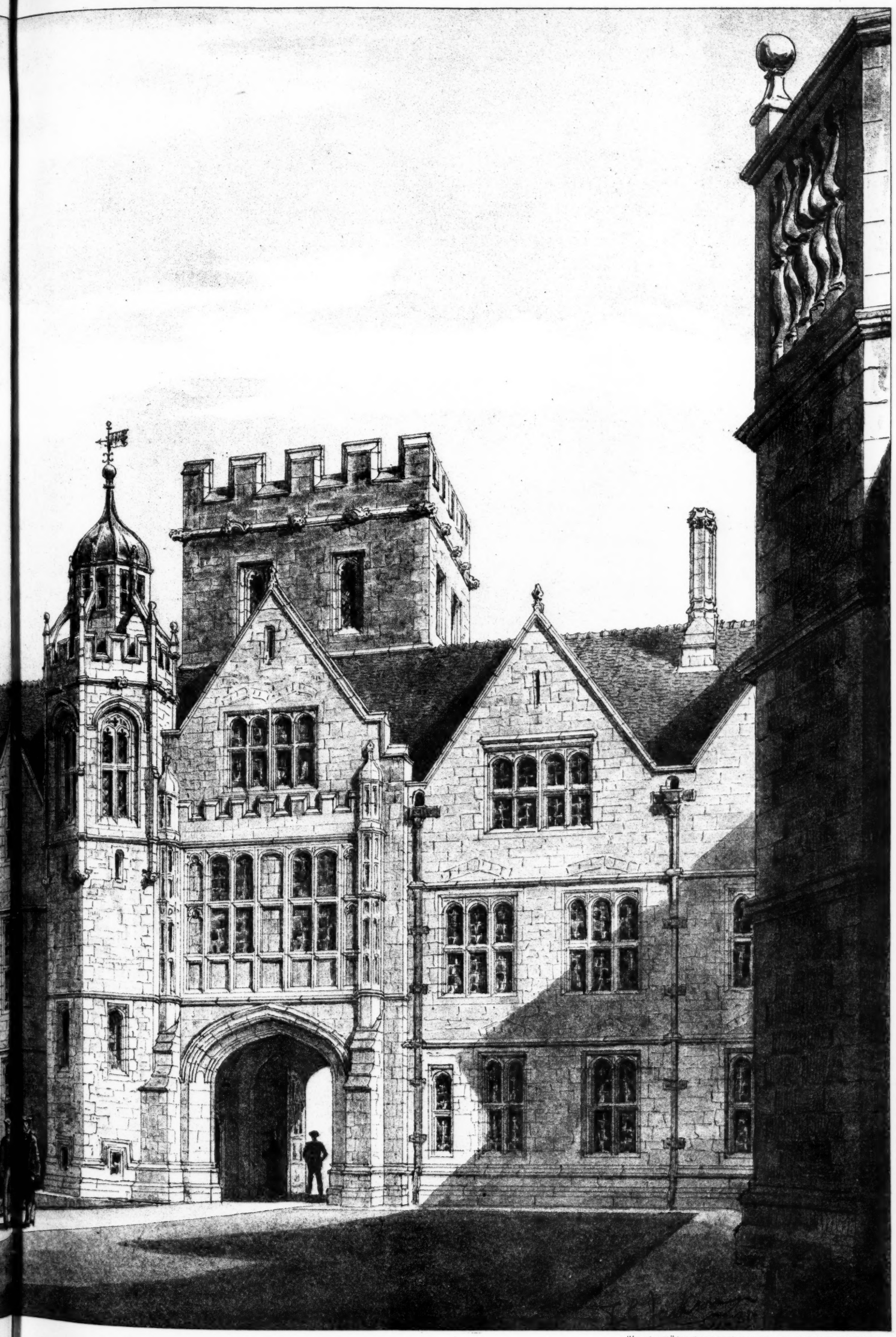


BRASENOSE COLLEGE, OXFORD: INTERIOR OF NEW QUADR



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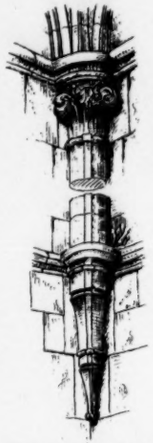

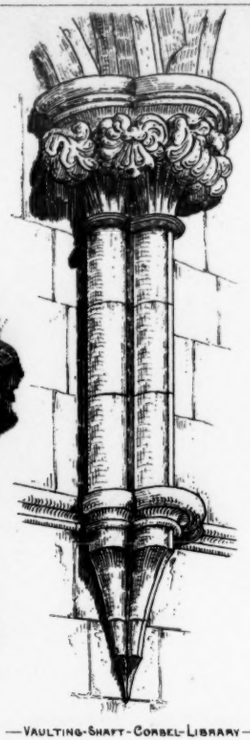

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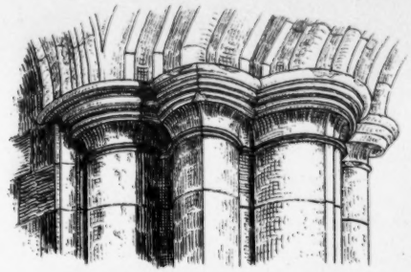

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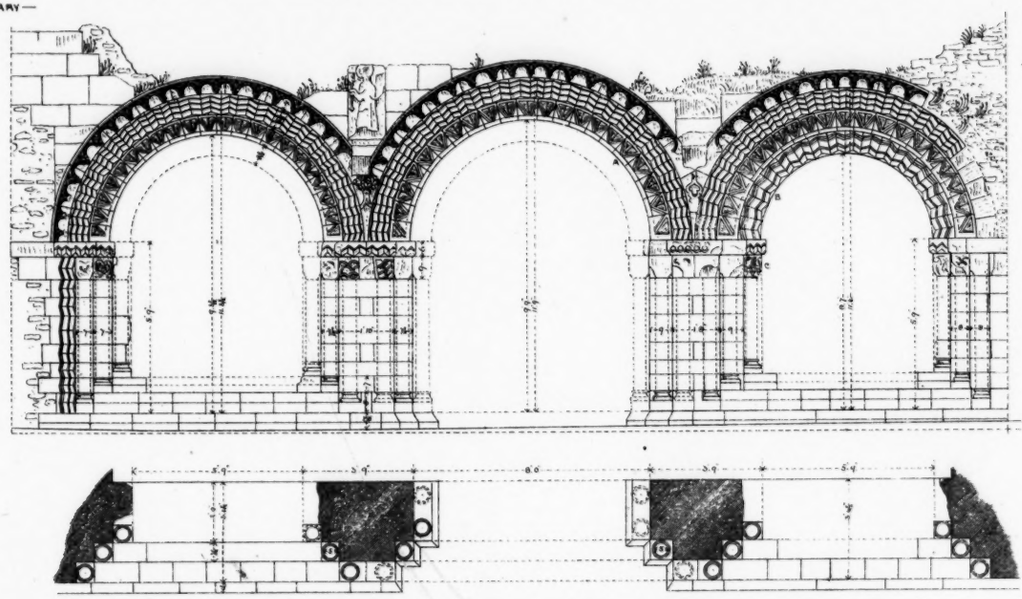
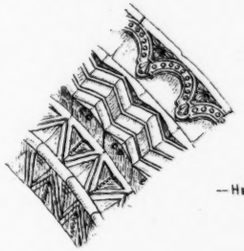


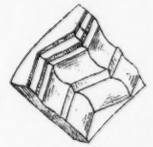
— ELEVATION & PLAN — WEST ENTRANCE FROM CLOISTERS — CHAPTER HOUSE —

— PEDESTAL - ANGLE OF OCTAGONAL FOUNTAIN - CLOISTERS —



— DETAIL OF ARCH AT A —

— CAPITAL AT C —



— DETAIL AT B —

— CARVING IN PANELS OF FOUNTAIN —

T. LOCKE WORTHINGTON, MEMB. ET DEL.

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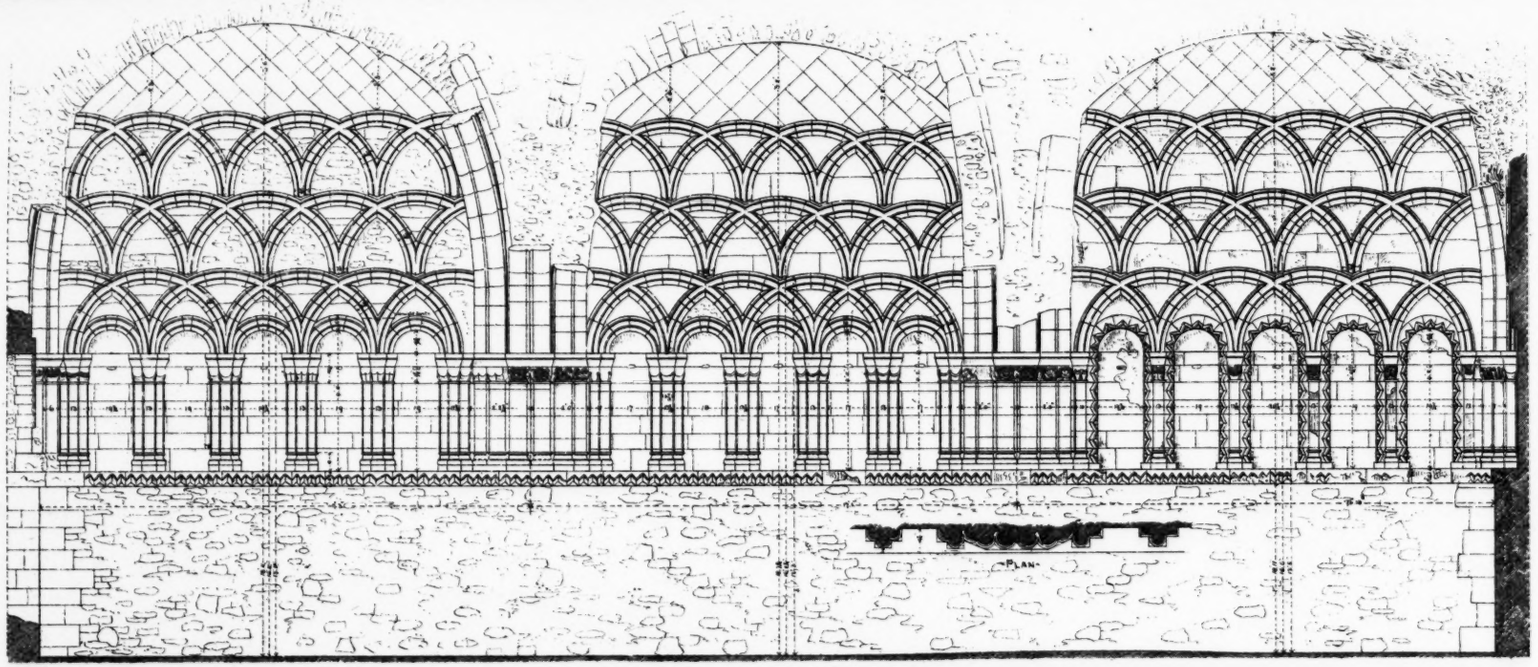
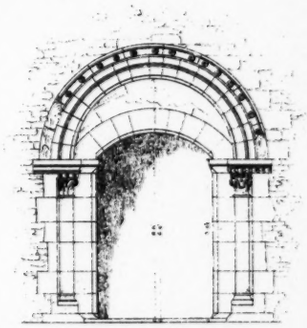


—North Elevation of Chapter House—



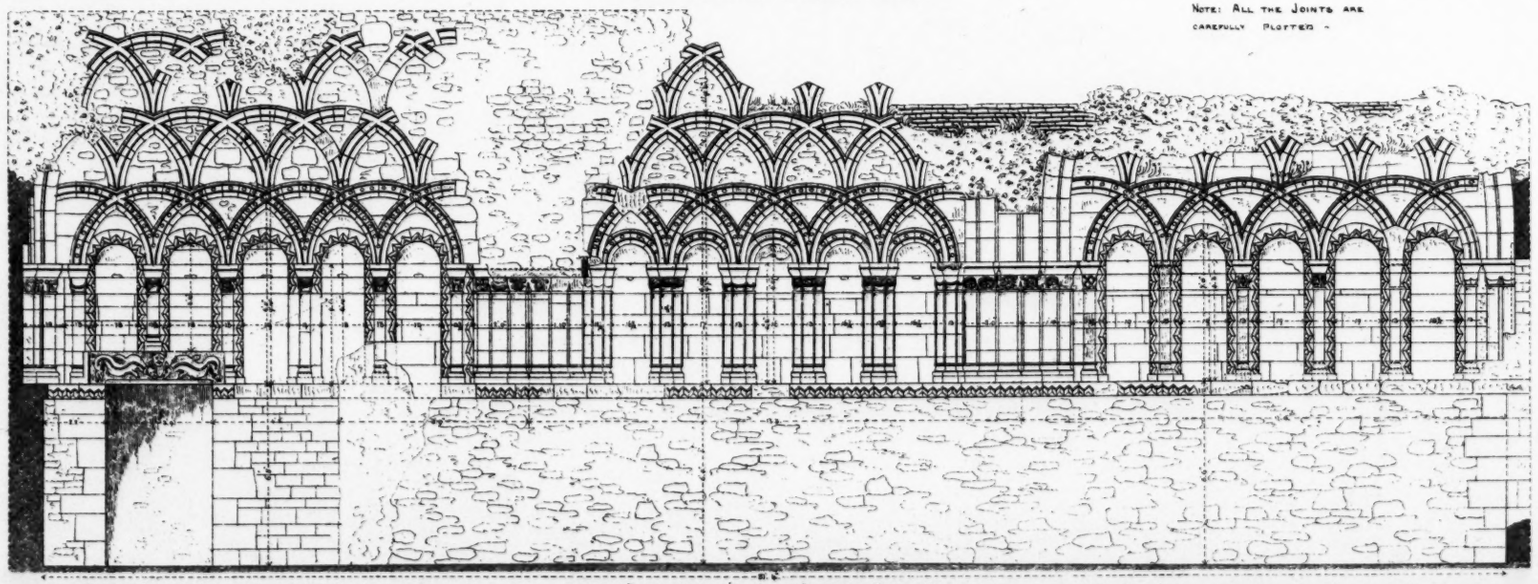
—Elevation—

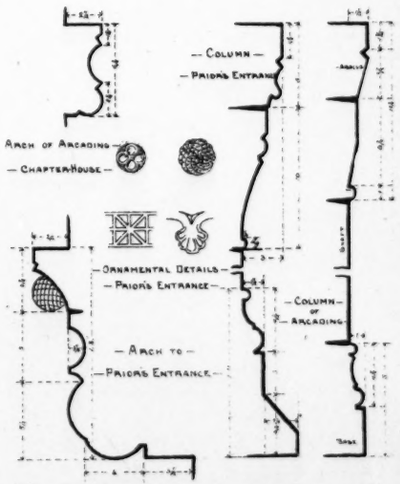
—Entrance to Prior's House, Norman—

—Note: This is now called the 'Cloister Room'—

—Plan—

Note: All the Joints are carefully Plotted.




Column — Prior's Entrance
Arch of Arcading — Chapter House
Ornamental Details — Prior's Entrance
Arch to — Prior's Entrance
Column of Arcading

— The Prior's Private Entrance —

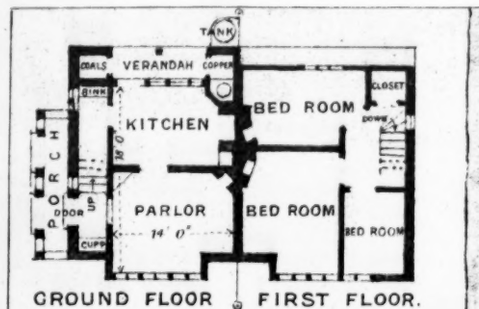
— South Elevation of Chapter House —

Scale 1 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 Feet

T. Locke Worthington, Mens. et Del.

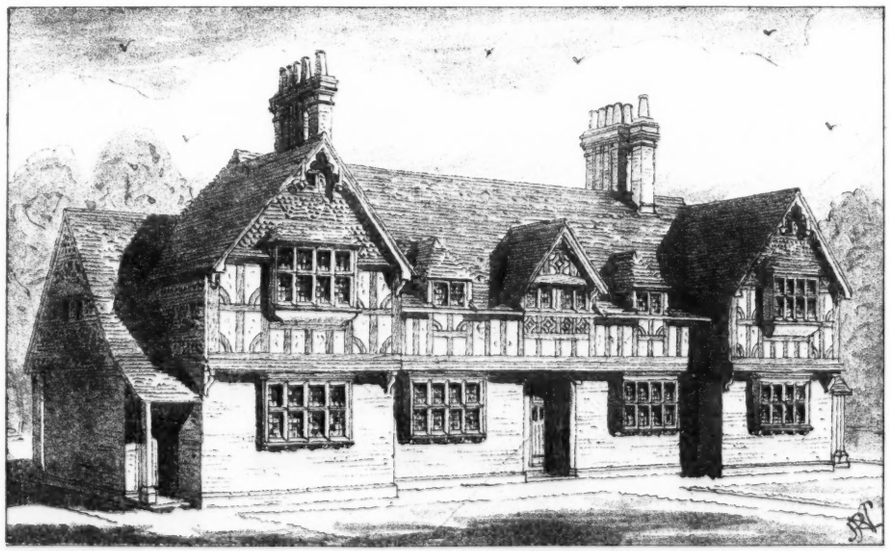
Photo-Litho, Sprague & Co London.

CHAPTER HOUSE, WENLOCK PRIORY, SHROPSHIRE.—Drawn by Mr. T. Locke Worthington, A.R.I.B.A.


TANK
COALS
VERANDAH
COPPER
SINK
CLOSET
DOWN
KITCHEN
BED ROOM
PORCH
DOOR
UP
PARLOR
14' 0"
BED ROOM
BED ROOM
CUPB
GROUND FLOOR
FIRST FLOOR.

LODGE AND COTTAGE.

DOUBLE COTTAGE.



FOUR COTTAGES.

DOUBLE COTTAGE.

"INK-PHOTO" SPRAGUE & Co. 22, MARTINS LANE, CANNON ST, LONDON, E.C.

LODGE AND COTTAGES AT GREAT WARLEY, ESSEX.—Mr. Ralph Nevill, F.S.A., Architect.

AT THORNCOMBE STREET.

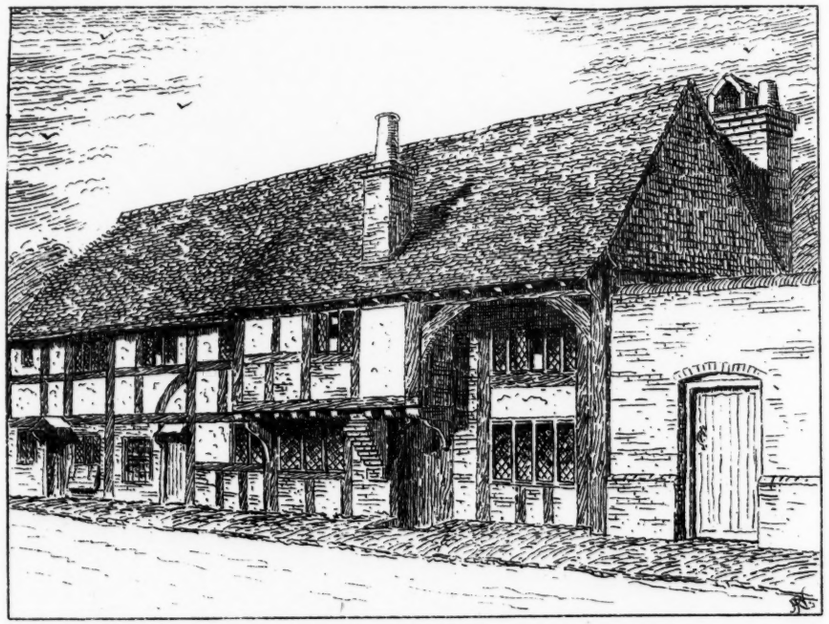
NURSECOMBE BRAMLEY.

AT THORNCOMBE STREET.

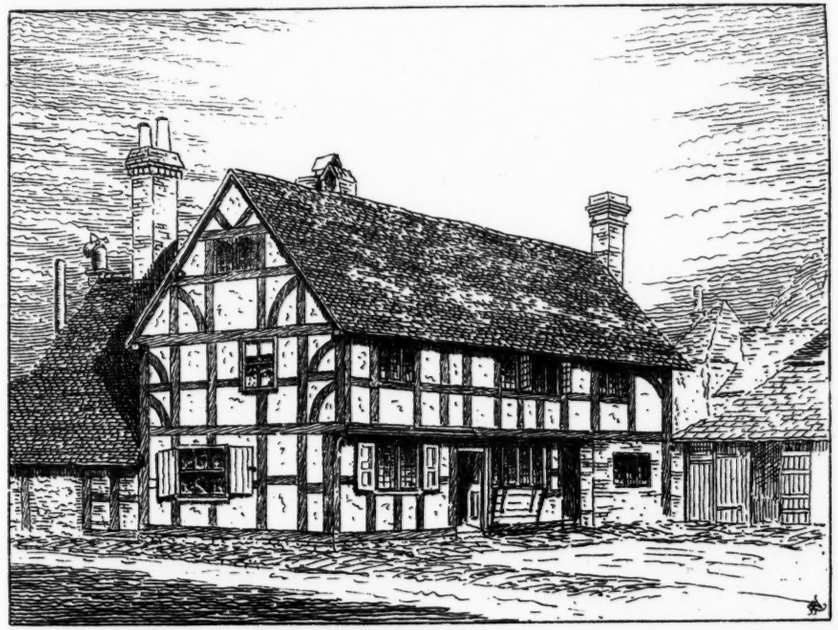
NURSECOMBE BRAMLEY.

PHOTO-LITHO, SPRAGUE & Co 22, MARTINS LANE, CANNON ST, LONDON, E.C.

OLD COTTAGE ARCHITECTURE.—From Sketches by Mr. Ralph Nevill, F.S.A.

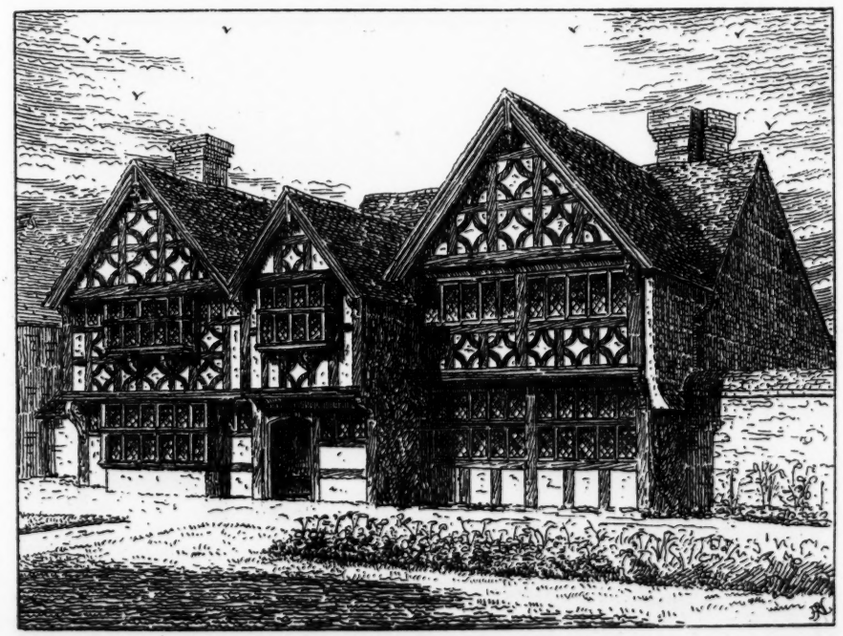


AT WONERSH.



AT WONERSH.

AT WONERSH.



GREAT TANGLEY MANOR.

PHOTO-LITHO. SPRAGUE & Co 22, MARTINS LANE, CANNON ST, LONDON, E.C

OLD COTTAGE ARCHITECTURE.—FROM SKETCHES BY MR. RALPH NEVILL, F.S.A.